GEOGRAPHY TEACHING IN INDIA

Containing 42 maps and Diagrams

BY

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Dedicated

to

My *revered teacher*

Dr. Kazi Saidud-din Ahmad

M. A. Ph. D (London).

Head of the Department of Geography,

University of the Panjab, Lahore.

To whom I owe all my inspiration in the subject.

FOREWORD

I HAVE read with great interest the "Geography Teaching in India" by Mr. Om Parkash Varma M. A., B. T., Lecturer in Geography, Hans Raj Mahila College, Lahore.

It is written for the Training College students taking up Geography as one of their special subjects and it covers the syllabus prescribed for them. The book is divided into three parts. The first part deals with the aims and methods of teaching Geography. The second part contains the principles of Geography and practical work necessary for understanding these principles. The third part contains specimen notes of lessons. A successful attempt has been made in the selection, arrangement and presentation of facts in an interesting and lucid way. Stress has been laid on the aims and objects of teaching Geography in making the pupil "a Citizen of the World, an international democrat and a patriot." This is according to the modern concepts of teaching the subject. The book is illustrated with neat diagrams and drawings. I hope the book will be found useful for the Training College students and teachers of Geography in secondary schools.

SOHAN LAL

Principal, *Rai Bahadur.*

Sohan Lal Training College for Women,

Lahore, 29th Sept. 1945.

PREFACE

ALTHOUGH there is no paucity of books on the "Teaching of Geography" yet a book which is scientific in treatment and comprehensive in scope is a rare one. Students find a great difficulty in getting suitable material from such a large number of books. The book has, therefore, been written in order to make the teaching of the subject scientific, interesting, and useful. It follows very closely the revised syllabus of the Punjab University and has been specially designed to meet the demands and difficulties of the students of the training colleges. It is meant to be useful to pupil teachers as well as to those interested in the education of the child.

The whole work has been divided into three parts. The first part deals with the theory portion of the syllabus. The second part deals with the practical aspect of the course. It has been seen from my experience of examining answer papers that a majority of students commits blunders because of their failure to under-

stand the fundamentals of geography. Therefore, a chapter on the "Principles of Climate," has been purposely added to prepare a thorough background for the understanding of the regional geography. The third part is essentially a general one and contains maps, diagrams, and University question papers. Three specimens of detailed "Notes of Lessons" have been particularly added for the guidance of pupil teachers. Each chapter has at its end a summary of the main facts for the sake of revision. This, in turn, is followed by suitable questions relevant to the chapter.

I am greatly indebted to my father, L. Ram Labhaya, Head Librarian, Punjab Public Library, Lahore, for revising the manuscript and making valuable suggestions for the improvement of the book. I wish to express my heartiest thanks to R. B. Sohan Lal B. A., B.T., F. R. G. S., Principal, Sohan Lal Training College, for Women, Lahore and formerly, Lecturer in Geography, at the Central Training College, Lahore, for writing a foreword to this book. The present position of the subject in the Punjab schools is indeed primarily due to his intiative and interest.

OM PARKASH VARMA.

ACKNOWLEDGMENT

The following books and magazines have been freely consulted and are gratefully acknowledged : Memorandum on the Teaching of Geography by an Association of Assistant Masters in Secondary Schools (George Philip and Sons, London) ; Teaching of Geography by Welpton ; Principles and Practice of Teaching of Geography by H. C. Bernard ; Suggestions for the Teaching of Geography by E. A. Macnee ; Teaching of Geography by M. Nazir ; Text book of Geography by Fry ; Climate by Kendrew ; Mapwork by Bryant ; Mapwork by Phyllis Dink ; A Class book of Practical Geography by E. Young and J. Fairgrieve ; Mapwork and Practical Geography by Bygott ; History of Geography by J. Scott Keltie and O. J. R. Howrath, The Indian Geographical Journal, Madras.

3, Onkar Road,
Krishan Nagar, OM PARKASH VARMA,
Lahore, 30th Sept. 1945.

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PART I

THE TEACHING OF GEOGRAPHY

CHAPTER I

THE MAKING OF GEOGRAPHY

Introduction.—The modern geography is defined as, *a unifying science ; the raw material it deals with is derived largely from other sciences and studies ; it deals with the material in its own way, seeking and discovering the inter-relation of phenomena and the interaction between man and those phenomena. Man in relation to his environment is its special viewpoint and its particular instrument is the map.* This modern definition was very lately recognized by geographers because the subject had a very chequered course of development. Let us trace the development of the subject up to this time.

DEVELOPMENT OF THE SUBJECT

I. **Descriptive Geography.**—With the birth of mankind on this earth there developed the idea of geography. It is because man had to think of his environment, food and shelter. Before the birth of Christ there existed certain settled states in the river basins of the Nile, the Tigris and the Euphrates. Various nations ruled over these states. Among those who came into prominence were the Babylonians, in 2400 B. C., the Aryans in 2000 B. C. and

the Phoenicians and lastly the Greeks who went to the west as far as Gibraltar. The travellers and the conquerors were inspired to know about this inhabited world, its inhabitants and the shape and the size of the earth on which they lived and its relation with regard to the universe. Among those who took the initiative, the Greeks played the most important role by establishing trade and commercial relations with other states in the 7th century B. C. and onward. These travellers and conquerors on their return from their journeys would relate accounts of their travels and experiences in the form of stories and poems. Thus the poems of Homer and the stories of Odysseus are well known. At that time it was thought by the Egyptians that the earth was oblong in shape and that their own country was its centre.

Among those notable travellers who contributed something invaluable to the subject of geography were the following :—

Pythagoras, born in Samos in 582 B. C., was a great Egyptian traveller and was the first to find out the shape of the earth and its position in the universe. He said that the globular earth is revolving with other five planets round some fire and that the earth is also rotating round its axis.

Similarly Herodotus of Halicarnassus (484-425 B. C.) was known as the father of geography. We inherit from him the well known saying *Egypt is the gift of the Nile.* Plato too contributed a lot towards the human geography by explaining the bearing of physical factors on the character of

the Greeks. Aristotle also explained eclipses. Alexander the Great added much information to geography through his conquests. It was he who founded the town of Alexandria. He also prepared maps of his routes and the places he conquered.

Next came the Roman Empire which developed much of the Mathematical geography. The circumference of the earth was calculated as 25000 miles and a map was also prepared. Hipoarchus, the Roman astronomer, introduced the ideas of latitudes and longitudes. Similarly Strabo, the great historian, wrote an encyclopaedia of geographical information in 17 volumes. Next came Ptolemy, the cartographer, who prepared the science of preparing maps.

The Christian era did not contribute much to the subject of geography except some minor additions here and there. After this Muslim culture became of great importance particularly in relation to geography and consequently Muslim geographical work began to appear. Among those, the Arabs were the first to snow their interest in geography because of their natural surroundings. Thus there was quite a good number of Muslim geographers who added much to this subject and wrote many books on geography. One Muslim geographer gave explanation on the formation of mountains by folding and sculpturing, erosion and weathering. Those Arabian and Muslim travellers who went to China and Japan in the east and to Sicily in the west gave description of their travels in the form of stories and essays among which stories of Arabian Nights, Sind-

bad the Sailor and Four Darveshes are very amusing to read. For example, early in the 9th century Caliph-Al-Mamun of Bagdad gave a strong impulse to geographical and other kindred studies. Mohammed ben Musa, Librarian of Bagdad, compiled a description of the world. A more important figure was Idrisi (1099-1154), an Arab of Spanish birth. He devised a substitute for a projection by dividing the inhabited world into seven climates or zones between the equatorial line and the arctic region; each of these was divided into eleven equal parts by perpendicular lines.

At the end of the 13th century trade relations of the Christians and the Muslims became widespread and established, and the knowledge of an individual about the world was much enlarged as compared with that of the Greeks. Thus we have seen that this classical period was marked for the stage of descriptive geography, expressed through stories, descriptive passages and poems. During this period church was considered to be the most powerful instrument of education and therefore missionaries began to move about to spread education. The Arabic literature on geography was translated and studied by these western missionaries. The year 1453 was a landmark in the history of the development of geography when the Greeks were driven out from Constantinople by the Turks. No doubt these Greek missionaries preached the study of ancient writings but geography as an independent subject had no place in the curriculum.

Therefore, Geography was defined by these geographers as the *Description of the earth.*

II. Sailor Geography.—The Renaissance marks another step towards the march of modern geography. During this period ranging from 14th to 16th centuries, great discoveries and explorations took place and therefore a knowledge of geography acquired a practical value. It is now that we see the development of maps which became more and more like those of to-day.

The first traveller whose journeys resulted in a noteworthy addition to the knowledge of Mughal Empire was Joannes de Plano Carpini, an Italian of Umbria. Bacon too revived Aristotle's opinion as to the spherical form of the earth. Next follows the Venetian Marco Polo, the greatest of all eastern travellers of this period, who accompanied his father Nicolo and his uncle Maffeo in their journey to China. Polo was the first traveller to trace a route across the whole length of Asia naming and describing kingdoms he had seen.

Prince Henry, surnamed the Navigator, (1394-1460) fifth son of King John I is a great personality of this age and was known as the maker of geography. He gave instructions in cartography and astronomy to sailors and seamen through Arab teachers who did much to spread the knowledge of geography.

When the new world was discovered by the Portuguese, they tried to map it out and new routes leading to the East and the West Indies were found

out. Germany too became a central institution for the development of mathematical and descriptive geography.

The first English geographer who wrote a volume of scientific geography was one Mr N. Carpenter. Before the 15th century geography occupied a very subordinate position in the school curriculum. In the 16th century it was Sir Thomas Elyot who gave real life to this subject by preaching that Geography broadens the outlook, enlarges imagination and quickens the sensibilities. He, therefore, lay special emphasis on the use of pictures, plans, and maps in teaching Geography. He was not satisfied merely with this but, on the other hand, he replaced modern languages by a study of maps and astronomy in the school curriculum.

Thus we have seen how the age of discovery, and exploration inspired the explorers to leave their homes in order to gather a knowledge of practical utility because of its great value to the art of navigation. Maps had to be prepared of coasts, seas and oceans explored and thus there came into being a new form of Geography known as Sailors' Geography unlike descriptive Geography of early days. This Sailors' Geography followed the Capes and Bays method of teaching which meant memorizing geographical facts, like the shape of the earth, tides of the ocean, names of oceans and seas, names of rivers and their courses, principal kingdoms and important towns. There was one remarkable change in the 17th century and it was that Geography was included

in theschool curriculum because of its practical utility for navigation. Nothing particular happened in the 18th century.

III. Physiography :—The rapid development of science in the 19th century and the rise of material prosperity compelled the educational authorities to teach science in schools. The rapid development took place because of wide knowledge of the people through the work of scientific explorers like, James Cook, Humboldt, Wallace, Columbus, Vasco-de-Gama and Magellan. The increased knowledge led to the birth of other sciences, like Physics, Chemistry, Astronomy and Geography. From these new sciences there emerged a hotch potch of geography to be known as Physiography. Thus the older geography broke up into a number of sciences from where new geography was crystallized out under a new name of Physiography. This led to the study of Physical Geography which meant *systematic treatment of the earth features and their relation with one another* without their bearing on human activities. In this, the facts were arranged in an orderly way like a science and the subject was correlated with other subjects by including scientific terms. Naturally, the subject of Geography began to be included in the coursesof various universities. Theuniversity of Paris was the first to found a chair in Geography. It was Karl Ritter, a German professor of Geography who presented the subject in a new light, i.e., *as a bridge between physical sciences and humanistic studies.* It was he who emphasized the correlation of history and

geography. Thus Geography came to occupy a central position among school subjects. Geography was defined as the *Science of Distribution.*

IV. Human Geography.—Still later another lift was given to this physiography when it was inclined towards the human side while keeping the scientific aspect. This is the latest trend of geography. To-day, Geography appears as a subject with human interest i. e. *the science of man on the earth.* To define properly the subject of geography it may be said that it is *a science which treats of the influence on man of local conditions.* A critical study of this definition will reveal that only one-sided human outlook was given to Geography i. e. man must obey nature. It means that man is subservient to nature.

To-day even this definition has undergone another change. It is no longer the science which studies the influence of physical factors on man. Instead, it is a science of man on the earth studying the action and interaction between man and nature. Thus the following definition is generally accepted to-day : *The function of geography is to train future citizens to imagine accurately the conditions of the great world stage and so to help them to think sanely about political and social problems in the world around.*

This definition lays proper emphasis on the position of mankind in the realm of nature. It states the active part played by man on this world stage. Man changes the setting of the stage of the world consisting of physical factors i. e. mountains, rivers etc. and plays his part. Sometimes he gets defeated

and at other times he gains a measure of control over nature by changing the whole aspect. He converts a desert into a green carpet through canals and overcomes mountains by cutting tunnels through them. Thus there is always an action and interaction between man and nature.

SUMMARY

The development of geography had a chequered course. It passed through various stages and at every new stage the conception of geography also underwent a change.

I Stage. Descriptive Geography :—

(a) Geography is the description of the earth.

II Stage. Sailor *Geography.*

III Stage. Physiography :—

(b) Geography is the science which interprets different features that exist on the earth and their relations with one another.

IV Stage. Human Geography or Regional Stage.

(c) Geography is the science which treats of the influence of physical factors on mankind.

(d) Geography is the science which studies the action and interaction between man and nature.

(e) Geography is a unifying science ; the raw material it deals with is derived largely from other sciences and studies ; it deals with the material in its own way, seeking and discovering the inter-relation of phenomena and the interaction between man and those phenomena. Man in relation to his environment is its special viewpoint and its particular instrument is the map.

QUESTIONS

1. Geography has risen to a position of the utmost importance in the curriculum, and no secondary school course can be regarded as complete unless adequate provision is made for the teaching of the subject up to and including preparation for the matriculation examination.

Discuss the statement, explaining how the development has taken place in the subject during the last century and why it is being considered as an important subject.

2. Trace briefly the development of geography teaching in general.

3. What do you understand by Physical Geography and how did it come to be introduced in schools of England ?

CHAPTER II

NATURE AND FUNCTION OF GEOGRAPHY

Every science, as the word suggests itself, follows a scientific course in the study of its subject matter As, for instance, Physics studies the physical laws of nature in a scientific way and psychology studies the human mind. Geography is now-a-days considered to be a separate science having its own raw materials to study and its instrument of studying is the map. In a broad way, we can conveniently say that the subject matter of geography is the earth, not only the rock, nor water that encircles it nor the universe nor the man that inhabits it nor the atmosphere that surrounds it. Still it studies each and all. It is quite evident that all these contents have a direct bearing on one another and have a particular meaning to the man. Therefore now-a-days the human aspect of the subject of geography is most emphasized. This is why we define geography for school purposes as, *the study of the earth as the home of man.* Besides, this humanistic trend in Geography has been brought about because of the great revolution that took place recently in the educational psychology. To-day we are more

bent towards the needs and interests of the child rather than towards the academic demands of the subject. Thus geography curriculum is prepared to satisfy the needs and nature of the pupils. It is clear then that the nature of geography is the *human geography.* To make it more explicit let us go in detail. Now it is a self evident fact that the child has to live in a world of diverse things and events, where also various human communities are living. The child has to pass his leisure time among these various communities and establish new relations with them. The purpose of education is to provide him with opportunities to exercise his intelligence, develop his imagination, widen his vision, temper his judgment and quicken his sensibilities so that he may study correctly the conditions of the world and think sanely and act wisely with regard to the social and political problems of the world around him. Knowledge for itself is meaningless unless it is employed as a means to ennoble one's life. Let instruction then be the stepping stone and not the end.

The geography teacher should teach his subject to the extent of adopting and using it to the harmonious development of his pupils' powers, capabilities and activities. The geography teacher's aim is cultural, not academic or professional. He is more concerned with interpreting world and its inhabitants in the light of geographical knowledge than preparing his pupils as geographers, or cartographers, or surveyors. His business is to make the child interested in man

and citizens of the world and their problems. The ultimate aim is to mould the child as a true citizen not only of his country but of the wider world because the citizen of to-day is not merely the citizen of his own country. Since no man can live by himself, similarly no community can live unto itself. It is natural then that our pupils should know what each community is and what its political and social aspirations are and what its relations with ourselves are.

A geographer studies the earth for the sake of knowledge. On the other hand our function of studying geography is to interpret world problems in terms of geography. We include, politics, economics, history and science in our study of geography of the earth. Thus our theme is the same but our angle of looking at it is different from that of the geographer. Hence for school purposes we shall define Geography as the study of the peoples of the world.

SUMMARY

The nature and function of geography is to train future citizens to imagine accurately the conditions of the great world stage and so to help them to think sanely about political and social problems in the world around.

QUESTIONS

1. Discuss the following definitions of geography :—

(a) Geography is the description of the earth.

(b) Geography deals with the adjustment of human groups to their physical environment.

(c) Geography is the study of the interaction between man and his environment.

2. Explain : The function of geography is to train future citizens to imagine accurately the conditions of the great world stage and to help them to think sanely about political and social problems in the world around.

3. What is the modern conception of geography ?

CHAPTER III

SCOPE OF GEOGRAPHY

It sucks honey from every flower.—The subject of geography has a vast scope. Its study covers all the phenomena of the earth's surface and thereby explains the principles of day and night, seasons, climate, surface forms and river erosion, flora and fauna and distribution and development of varied human communities. Being so vast it became impossible to study the whole of it and, therefore, the need arose for specialization. The subject now includes many other subjects, physical sciences like physics, chemistry, mathematics and astronomy on the one hand, and natural and humanistic studies, like botany, zoology and anthropology, sociology and history on the other. Thus it includes one and all branches of knowledge in its scope. Like the bee it sucks honey from every flower. Consequently it lends and borrows interests both to scientists and to students of social sciences. As a natural result of such a vast scope the subject of geography has broken up into numerous branches.

(a) **Physical geography.**—It studies relief, soil and structure. This lays down a foundation for

other branches and therefore is the most important. It is on this branch that the super structure of regional geography is based.

(b) **Biogeography.**—It is the geography of plants and animals related to Botany and Zoology. It studies the evolution, type and distribution of flora and fauna.

(c) **Economic geography.**—It is concerned with the production and distribution of the raw materials of the country. The internal, external and international trades also come within its domain.

(d) **Human geography.**—It covers the evolution of mankind, its different races and their distribution.

(e) **Mathematical geography.**—It has its subject matter the earth as a planet. The science of drawing maps is known as cartography and is a derivative of this branch of geography.

(f) **Political geography.**—It deals with the government of states and countries.

The above short description reveals that as the subject of geography trespasses into the domain of other subjects, it was considered that the subject of geography had no existence of its own. This charge was correct a century ago. Now it has been changed altogether as is clear from the well known definition of the subject, " Geography is a unifying science ; the raw material it deals with is derived largely from other sciences and studies. It deals with the material in its own way seeking and discovering the inter-relation of phenomena

and the interaction between man and those phenomena. Man in relation to his environment is its special viewpoint and its particular instrument is the map."

Like other subjects it derives its raw material from other sciences and like other subjects it studies the derived raw material from a different angle and in a different manner. Mark the words in the above quoted definition, " It deals with the material in its own way and man in relation to his environment is its special viewpoint and its particular instrument is the map."

Now it is self evident that every science studies some restricted part of the universe and examines it from its own point of view. For instance, Astronomy deals with the unit of star and star system and history studies human groups. Similarly, geography has its unit of study the regions of the world. Each region though united with the other, still has its own peculiarities to be noted. Thus geograghy studies unity in diversity and *vice versa.*

The geographer studies each region and tries to put forward geographical explanation for its conditions and life as a whole. While on the other hand the geologist, the meteorologist and the botanist study the same region but from a different angle. Each specialist confines himself to one region and leaves the other to be explored by others. The difference between the geographer and the specialist lies in that while the specialist follows its own

thread in its diverse wanderings, dissects it and sets apart from it knotty interweavings with other threads, the geographer studies the interweaving of all the threads and patterns that result from this interweaving with different threads.

To sum up, geography then takes a very wide outlook and tries to interpret the action and interaction of all physical factors in relation to the intricate problems of the life of man on the surface of the earth. Therein lies the utility of studying this subject. Geography brings us into living contact with the live actions of all the human beings. It broadens outlook, stimulates observation and imagination, develops foresight and quickens the sensibilities. It brings within its field of study every form of human occupation and every effort directed to harness nature for the progress and development of mankind.

SUMMARY

Geography is very large in its scope. It sucks its raw material from many other subjects. It treats the raw material in its own way and studies the subject from human point of view. It tries to provide solution for social and political problems of mankind. Since it overlaps into other subjects, it is divided into the following branches, (*a*) physical geography, human geography, economic geography, mathematical, regional, biogeography, political geography and historical geography.

QUESTIONS

1. Explain " Geography is a link between scientific and human subjects. "

2. How does Geography help in broadening the outlook of pupils ?

3. What do you understand by human geography ?

4. Physical conditions have a great effect on human beings. And also human beings have some freedom and are not entirely dependent on their environment.

Discuss the above and give examples in its corroboration.

5. How does geography help in the development of world citizenship ?

CHAPTER IV

OLD AND NEW GEOGRAPHY!

From the previous survey of the development of the idea we may note the following points of difference between the new and the old geography. The old 'geography stated a brute fact ; sometimes it was a dull one, *e. g.*, a list of capes and bays, or countries and county towns, which had to be learnt by sheer force of memory. On the other hand, the new geography, although it primarily deals with facts, has benefited from the scientific movement and is inclined more towards the human side. In the old geography reason would come afterwards but in the new geography cause would precede the effect. Memory was the chief instrument of learning in the old geography, while every fact is learnt as guided by reason in the new geography. The subject of geography is made to adapt the needs of the child to-day but in the past child was adapted to the subject of geography. Then again, map work occupies a prominent place today, it being the chief instrument of teaching and learning, the aim being to enable the child to read in map, think in map and write in map, but in the past map work was

totally neglected. To-day the method of teaching proceeds from known to unknown, simple to complex and from homeland to the outer world. Lastly, we teach reality in geography but in the past we used to teach real facts in an artificial language. In the past geography was vocational but to-day it is cultural.

SUMMARY

Geography to-day has changed altogether. Even the methods of teaching have undergone a revolution. Everything is taught with reference to the mental stage of the pupil.

QUESTIONS

1. What educational objectives can be achieved through the teaching of geography in the school ? How far does the presentation of the material of the present day teacher differ from the geography teacher of the past ? (P. U. 1941)

2. How does the new geography differ from the old geography ?

CHAPTER V

IMPORTANCE OF GEOGRAPHY IN THE MODERN TIMES

It is a geography war.—The knowledge of geography helps in the successful execution of war. To-day it is a geography war. This is indeed a war in which geographical circumstances and factors are performing a prominent function. The geography of the belligerent countries is the director of all land, sea and air operations. Even the defence preparations are also based on the geography of their lands.

Geography has a utilitarian value.—A knowledge of geography helps in the earning of one's living. Every business-man has to study the taste and customs and habits of the people in order to be a successful man.

Geography has an educative value.—More than anything else, our students should know all about the natural resources of our country and of other countries coming in contact with it, so that they may, when their time comes, contribute their proper share to the regeneration and development of their motherland which has such a vast potentialities. Even the weathers and climates of India are

poorly understood by many of us, and we are greatly handicapped by the lack of geographical knowledge.

Geography has also an interpretative function.—It elucidates and re-interprets the complex relations between the physical environment on the one hand and distribution, mode of life and economic and social activities of man on the other hand, both in the present and the past.

Geography is an aid to other studies.—The aid which geographical research can render to allied subjects, like history, economics, sociology, commerce and agriculture is invaluable. No study of these subjects is complete or thorough without the background of geography given to it.

Geographical knowledge broadens the vision.—It broadens the mental outlook of the pupil and thus makes him a true citizen of the world. He, then, offers a critical attitude towards the world problems and is not swayed away by the slogans of the press and the leaders. Thereby his innate capabilities, observations, imaginations, thinking and reasoning are developed to the fullest extent.

Geography helps us to understand the newspaper.—Now-a-days news is of vital importance even to a street boy. Places mentioned and questions involved have a great geographical importance. Therefore the understanding of the news has a great bearing on the geographical background of the reader.

SUMMARY

Geography is of practical importance in the present day world.

1. It helps in the successful execution of war.
2. It enables one to earn one's living.
3. It is of great educational value.
4. It solves mysteries about human beings.
5. It is an aid to other subjects.
9. It develops our latent potentialities.

QUESTIONS

1. Give reasons for including geography in the school syllabus.

2. (*a*) How does geography compare with other subjects in achieving the aim of education ?

(*b*) Do you think there is more reason for teaching pupils how to study geography than how to study other subjects ?

3. What is the importance of geography in the present day times ?

CHAPTER VI

AIMS AND OBJECTS OF GEOGRAPHY TEACHING

It is a primary question.—The question of aims and objects of teaching a particular subject should be the first to occur to a wise teacher. It is because the aims of teaching a subject govern its methods of approach. Therefore, it becomes essential to know why geography should be regarded as a subject of great vital importance in the curriculum, and what is the particular contribution made by it to the education of the future citizen.

Now it is a well known fact that all subjects are not merely informative in nature and, therefore, each has its particular value to add to the curriculum. As, for instance, Mathematics encouarges accuracy and habits of reasoning, and classics develop habits of logical thought. Let us, then, determine the particular part played by geography.

A little glance at the past history of geography will show that the development of science which occurred in the 19th century brought about a new outlook in the teaching of geography. To-day, it is more concerned with providing the child with tools

with which he should study the communities of the world. It is also more concerned with suggesting means and ways for their social, political, and racial problems, than giving mere facts about the world and its contents. Let us see, then, how the ultimate aim of world citizenship can be achieved through the teaching of this subject.

The instinct of love is inborn in a human being and then why not to make use of it ? In order to create a desire in a child to serve willingly his country and his fellowmen we should make him to love his country. The best way to create a love for one's country is by getting one to know it thoroughly. Let me take the concrete case of an Indian child. The teacher of geography should lay honestly before him the interests, aspirations and traditions of India. Let the child feel the political, social, and racial tides from his study of books, direct observation and experience. He must make a dispassionate study of the subject of geography in a way which is least prejudiced by the words of the press or the leader. He should provide a critical attitude towards all that concerns India. By these means we can direct the child on to the right path and thus convey the true meaning of the word "citizenship".

Some educationists oppose it by saying that this is not possible by school geography. Unfortunately, they fail to realize that an intensive study of the school region can conveniently give training for this future task that confronts our child. He will be compelled, in the study of the school region, to

enumerate obstacles offered by nature and investigate the means by which human beings can react on that environment profitably.

So far we have been talking about the citizenship of one's country. But a geography teacher has to proceed cautiously ahead to inculcate a still wider citizenship. The knowledge of an individual is much enlarged to-day. Besides, every one feels that we are all interdependent on one another. The world is no longer composed of isolated groups. It is most desirable that the school geography lesson must have a bearing on the vital problem of the world citizenship. Therefore we should teach geography of the world from a national point of view.

Geography, then, should help the child, to understand the problems of his local environment, his country and other countries. It should foster citizenship of one's town, village, country and the world based on intelligence.

The aims of teaching geography may be summarized as the following :—

1. The first aim of teaching geography is that it should provide a mental discipline by which it is meant that *the subject should train the pupil's whole mode of thought which in its turn influences his intellectual life and his studies in the same field.* This mental discipline comes through the application of scientific attitude in distinguishing facts, interpreting their effects, and thereby making conclusions and drawing inferences.

2. Secondly, Geography teaching broadens the mind with the information it gives and fires up imagination. Besides, it replaces travel. The knowledge thus acquired is applicable to one's daily life in locating places, in reading and talking, in correspondence and business.

3. Thirdly, Geography has a special function to perform. From one's study of differnt peoples of the world one knows the share of each nation towards world culture. He also realizes the interdependence of mankind. Thus a sympathetic attitude is developed among pupils when they find similar needs all over the world. It further explains to them that the difference in the physical character of the people of the world is due to difference in their physical environment.

4. Then again, war and aggression are rife to-day owing to ignorance of what other people are thinking, and how they are living. A knowledge of geography, if applied, can bring mutual service and confidence. Thus it will produce good citizens of the world.

5. On the material and practical side too, the subject of geography has some meaning. The advancement of the nation is measured by the services that it has rendered to other nations. The improvement of the lot of backward nations and the profitable utilization of increasing amount of leisure are vital problems that face the world to-day.

6. A large section of the people of India complains that modern educational system has failed

in its purpose and that people have grown self centred. Teachers in general and geography teachers in particular are held responsible for this state of affairs. The teacher of geography should be prepared to lay such a background of geographical knowledge so that pupils should turn a critical attitude towards the opinions of the leader and the press and discover facts and dissect principles before giving them a practical shape.

7. Another aim in geography teaching should be to make the school course complete in itself, because geography is the philosophy of life. The pupil should feel that it is not possible to maintain the same standard of comfort all over the world. He should realize that all this necessitates living on international co-operation. Then, geography lays down foundation for the solution of economic, social and political problems.

8. A student of geography can appreciate the beauty of landscape which might cultivate a sense of responsibility for its care and its protection. The study of natural scenery may become a good pastime with him.

9. Geography has a cultural aim too. *Culture is the sympathetic appreciation of the universal truth expressed in art, literature, philosophy, science and religion.* Geography develops their cultural interest in travelling; in reading news-papers; in developing a taste for literature on travel; in developing hobbies like model making, stamps and picture collecting.

10. Last, but not the least important aim in teaching geography, is that the training in citizenship should make the pupil realize that it is within man's power by continuous selfless effort to dictate nature. The child should become conscious of the fact that he is not merely an onlooker at the worldly affairs but a principal actor on whose contribution, based on intelligence and skill, depends the destiny of the world civilization.

So the ultimate aim is to prepare the child for the world, to make him a practical man, a patriot and a live citizen. To put it in the words of geography, "The aim is to train the future citizen to imagine accurately the conditions of the great world stage and so to help him to think sanely about political and social problems in the world around him."

To the attainment of this high and wide aim the lesser and subordinate ends are necessary stepping stones. Hence, while the educator must have his eyes fixed on the ultimate value to be attained, the geography teacher should give his contribution to the general aim of education by taking such measures as ensure sound factual knowledge, a clear understanding of fact relation and a keen discipline of intellectual power.

SUMMARY

The duty of the geography teacher is to contribute something to the general educational fund. This educational fund has its purpose to prepare a world citizen, an international democrat and

a patriot. The function of geography teaching then is "to train future citizens to imagine accurately the conditions of the great world stage and so to help them to think sanely about political and social problems in the world round him". To achieve the final aim the geography teacher should bear in mind the following subordinate aims :—

1. To discipline the mind.
2. To broaden the outlook.
3. To fire up imagination.
4. To cultivate a co-operative spirit.
5. To develop the observation power.
6. To introduce the pupil to the use of map.
7. To make the hand a useful servant of the brain.
8. To teach the dignity of labour.

QUESTIONS

1. "Geography, if properly taught, can help pupils not only in understanding but also in getting into real sympathy with the people in other lands."

Show how you will try to keep the aim in view when teaching the geography of Lahore or Ceylon or China or Japan to a mixed class of all communities. (*Aligarh University*)

2. In various discussion lessons pupils offered the following answers. How will you deal with them ? (*Aligarh University*)

"(i) Arctic region is cool.

(ii) Canals have been constructed in Germany for irrigation.

(iii) Bengal produces wheat and England produces cotton.

(iv) The people living in the interior of Central Africa are highly industrialized.

(v) Quetta is situated in Baluchistan.

(vi) Tibet is on the top of India.

(vii) Mysore is in the tropics, while Delhi is in the temperate zone. Therefore the hot weather in Mysore must be worse than the hot weather in Delhi.

(viii) Sind is near the sea so the climate there must be moist.

(ix) We actually see that the land all round is flat. How can we believe that the earth is round."

3. What are the practical and cultural aims of the teaching of geography and what relation should exist between the two ? *(Aligarh University)*

4. What aims would you keep in view while teaching geography in primary and middle classes ? How would you achieve these aims in the primary class ? *(P.U. 1944, 1945).*

CHAPTER VII

THE PLACE OF GEOGRAPHY IN SCHOOL CURRICULUM AND ITS CORRELATION WITH OTHER SUBJECTS

Geography occupies a central position.— Reviewing the development of the subject one would come to know how geography gained importance among school subjects. At one time it was supposed to serve other subjects like a faithful maid-servant. Later on it was included in the syllabus for some specific purposes and thus proceeding gradually it earned an important place in the school curriculum.

To-day geography is a link between physical sciences on the one hand and social sciences on the other. Consequently it stands midway between the two. It is considered to be a *Liason* subject. A large part of geography is a natural science and the remaining parc is a social science and even the latter portion is very closely related to the former. Because of its relation with the social and the natural sciences it earnestly appeals to the scientist and to a student of social sciences. The theme of this central subject is to study the action and inter-action between man and his environment. The geography teacher should guide his pupils towards this end and

both the subjects to break the monotany of the daily routine. Even geography and language answer-books may be interchanged by the two teachers. Books dealing with the literature on travel, discovery and exploration may be encouraged for study purposes. When such books are read by pupils they serve two purposes, one is the improvement of the vernacular and the other is that of acquisition of knowledge.

Geography and Mathematics.—It is a common cry of the educationists and parents that education should be useful to life. This, in other words means that problems that we set to the pupil should have a bearing on his life. Besides, a mathematics teacher has to give sufficient practice for the thorough understanding of a problem or a formula. How better it would be if the data for drill work is derived from the subject of geography! A mathematics teacher can find very useful data from geography because the idea of quantity enters everywhere in geography. We always study in quantitative terms the topics on population, distribution of animals, crop production, minerals and trade. Again, geography problems may be used for mathematical and algebraic lessons. Sometimes geographical solution has to be sought for the work in graphs.

In a similar manner a knowledge of geometry lays down a strong foundation for surveying and cartographical work in geography. The geography pupil has to draw maps and diagrams at every step to illustrate his points. Besides, the teacher too

employs graphs, charts and statistical diagrams as the means of teaching geographical facts. Naturally, these can be best understood with a knowledge of mathematics. In this connection it may be suggested that we have a special branch of geography known as mathematical geography.

Geography and History.—Geography and history are of course most intimately related. In fact, they are two sisters. Both are social studies, one stresses time and the other place. History studies people of different times and geography deals with the people of different places Therefore, historical facts can serve as a good basis for arousing interest for geographical lessons. Similarly geography offers explanation for historical actions of mankind. World is a stage on which man plays his part. Geography studies the world and history the action of the man on the world stage. For example, the expansion of the French and the English colonisation in North America was directly controlled by geographical setting of the land. The whole story of their colonisation becomes intelligible when geography and history go hand in hand. Pupils will come to know why the French settled along the line of St. Lawrence because that was the only river they could find that would lead them inside. On reaching inside the great Mediterranean Sea of great five lakes, they spread to the west, north, and south by cultivating friendship with the red Indians, who led them to the Gulf of Mexico by following the course of the Mississippi river. Similarly, the growth

of London, Delhi or Lahore is understood by one subject as much, as by the other. Ottawa and Washington are not necessarily, the most suitable capitals for Canada and U. S. A., their importance as administrative centres is very largely historical. The nomadic habit of the desert people is also due to geographical factors. Germany and France are hostile to each other because of the existence of the Rhine river and Lorrain coalfields, as the bone of contention in between the two countries.

Lastly, both history and geography have a common claim on the equipment of the geography room and on the instruments of teaching, *i. e.* maps, pictures, and atlases which are common tools of the two subjects.

Geography and Arts.—Even practical arts are correlated to geography. In a manual class, pupils may prepare almirahs, map holders, and map stands, thermometer cases, pointers, map screen, cup-boards and other articles for storage and exhibition and models of means of transport. In a book binding class, map repair work may be included. School gardening may explain the cultivation of agricultural crops and forests, grown in different parts of India. In a painting class, pupils may be asked to draw geographical scenery, e. g. desert, glacier, river and forested scenery. Drawing too helps a great deal in making maps and statistical diagrams.

Geography and Science (Nature-study, Physics, Chemistry, Botany and Zoology).—There has been so much correlation between these two

subjects that it has necessitated a common teacher for the teaching of two subjects.

Lessons on physical geography are best understood by a knowledge of physical sciences. For example, principles of climate, topography and movements of oceans, rotation and revolution of the earth, distribution of flora and fauna, the phenomena of earthquakes and volcanoes, weathering and erosion are the topics which are as much related to physics, chemistry, botany, and zoology as to geography. Similarly, the whole biological and zoological life is controlled by the chemistry of soil and climate. Nature study too prepares the child for geographical work. All these sciences have a common theme with geography, but each studies from its own point of view. A geography teacher studies rocks or distribution of forests or animals or men. Sciences too study these topics but from different angles and in greater details. Class excursions can also be utilized for nature study lessons.

Geography and Newspaper.—Lastly, we may suggest that geography is very closely correlated to current events. A newspaper of to-day is a text book of geography. The current topics have another function to perform in that they give reality to geography teaching. Similarly, geography in its part encourages the reading of newspapers and periodicals dealing with world affairs. Then again, a news of the day can give a very good start for a geography lesson. For instance, the

occurrence of a solar or a lunar eclipse is a very interesting topic for rotation and revolution. In this connection it is desirable that the teacher should have an up-to-date knowledge of the world affairs through reading books on literature and newspapers. Even the modern war can be explained from the geographical point of view. All the defence and attack preparations are governed by geographical factors. Many new towns have come into prominence.

Danger of over correlation.—It was Herbert who influenced the correlation of subjects of the school curriculum. Since geography can have very wide correlation with other subjects it has some danger too attached with it, for correlation means overlapping when the limit is trespassed. This involves repetition and waste of time.

To avoid this overlapping it is suggested that faculty meetings be held before the beginning of the term. The geography teacher should always be in contact with language, history and science teachers. If the same teacher teaches all the three subjects, this difficulty does not arise, otherwise cosultation between teachers of allied subjects is most essential to avoid waste of time and labour.

SUMMARY

Geography occupies a central position among school subjects, for it touches both the sciences and the humanistic studies.

It is correlated with languages, history, arts, mathematics and sciences. It lends interest to

them as well as borrows interest from them. It helps to interpret the news of the day intelligently.

The correlation has a possible danger of overlapping. To avoid that consultation among teachers is desirable.

QUESTIONS

1. How would you correlate the teaching of history and geography in the middle classes?
(*P. U. 1941*)

2. In what ways and to what extent can geography be correlated with other school subjects? Illustrate. (*P. U. 1939*)

3. How does geography compare with other subjects in regard to lending itself to correlation? Is it practicable to attempt correlation where each subject is taught by a different teacher?

4. Explain how the teaching of geography helps to understand current news.

CHAPTER VIII

SYLLABUS IN ELEMENTARY SCHOOLS

Geography in the infant and kindergarten stage.—(up to 7 years of age). The teaching of geography in this stage should be quite informal and, therefore, the teacher should simply awaken geographical interest in the child. The kindergartner should present such stories as have a geographical meaning in them, for instance, stories of Ramu the farmer and Raju the miner and about Koogak, the Eskimo boy and so on and so far. Pupils will have also heard of such animals as the lion, the elephant and the camel. Similarly, in the clay-modelling class they should prepare models of plasticine which might convey geographical ideas. They should be led to have a cursory glance of the nature around them, thereby gaining an idea about the geography of their neighbourhood.

Geography syllabus in Primary or Elementary schools.—Generally the syllabus for the primary school-work in geography is set as a broad guide rather than as a definite syllabus. Therefore, following are the minimum requirements that are demanded of the primary school :—

1. An elementary knowledge of the principal terms used in geography.—mountains, oceans, plains etc. These terms are to be taught with the aid of sand tray models, pictures and illustrations from the local region and homeland.

2. Meaning of a map or a plan.

3. Geography of the province leading to the geography of India.

4. First principles of world geography.

We have seen, that in this stage certain geographical facts and principles have to be fully grasped, but the main aim is still the same, *i. e.* to stimulate interest in the life of the people of pupil's own and distant lands. It is, therefore, most essential that the teaching should proceed through the nature study.

Let us see, then, what principles should govern the selection of a particular topic in the elementary geography syllabus.

PRINCIPLES OF SELECTION

1. **Aim of teaching.**—The first principle governing the framing of the syllabus in geography is the aim in teaching the subject. Now the primary aim in teaching geography is to make the child a true citizen of the world and to enable the child to study the world problems in a dispassionate manner. In order to broaden his outlook factual knowledge is the only instrument.

It is an agreed conclusion that brute facts form an indispensable part in any branch of

knowledge. Dates, names of places and records of events are the essentials of the subject of history. Similarly science too has facts consisting of formulas and principles. It is on these facts that the subject is based. In order to build a strong house of the knowledge of the subject the learner has to memorize facts to form an unshakable foundation. Therefore, memory work cannot be neglected in the study of any subject, but it should not be the chief instrument of studying a subject. What is true of other subjects can also be said of the subject of geography. The facts of geography are of a greater importance and more lasting value than of any other subject. As for instance, facts about the composition and preparation of carbon dioxide gas and the causes of the Mahrata War have a lesser meaning to the life of a man than facts about China, Russia, Mount Everest, or the Nile or the Ganges and India, because the latter are everyday topics. Of all the geographical facts place names of the area to be studied should be most emphasized. It is demanded that a matriculate student should have learnt at least 500 geographical features. But in learning facts discrimination must be used for judging its relevancy. Again, the pronunciation and the spelling of these place names must not be overlooked. If a teacher finds some difficulty in the pronunciation, he should not hesitate to seek the help of the language teacher. Thus geography and language will be correlated and the pronunciation and spelling are not overlooked. This will

create a geographical atmosphere and add reality to the subject.

However, all facts are not of equal value. Some are so indispensable that they demand a permanent attention. Such facts occupy the same position in geography as formulae in mathematics. Then the framework of geography consists of such main facts as, distribution of oceans, continents, their relative position, distribution of mountains, rivers, seas and climatic conditions, main routes and important towns. These facts form the skeleton to which the flesh of geography is attached. There are other facts which are of transient value only. While we may not take pains to have a permanent grasp of these but the student has to search for facts. Occasionally arises the necessity of giving training to pupils in the use of reference books and atlases. There is another class of facts which when they have served their purpose have to be banished to oblivion, thus freeing the mind for concentration on other things.

2. **Mental capacity.**—The child in the early stage is very rich in imagination and memory and the instincts of wandering and curiosity are prominent in him. Therefore the teacher's duty is to develop all these innate faculties by providing suitable material. The facts should not, merely be learnt but must be clearly comprehended and understood. As told before, facts are best learnt by the sheer force of memory which is very strong in young children but the right understanding of them is got by studying the relationship of one fact

with the other and when facts have been understood they have to be fixed up in mind by producing them in the form of maps and diagrams. Since the relations that exist between one fact and another are universal, therefore they are called the general conceptions or ideas or principles. For instance, the relation between temperature and pressure that the pressure falls with the rise of temperature and *vice versa* is a universal principle. An addition of these principles in the mind constitutes the intellectual power. Therefore, intellectual power rests on a clear grasp of general relationship. This intellectual power, then, becomes a necessary instrument for learning new things.

3. **Intellectual development.**—The child is not intellectually much advanced. His experiences are very few in number, therefore concrete objects have to be presented. If that is impossible, then models and pictures have to take their places.

4. **Map-work.**—Map is the chief instrument of teaching and learning geography. The aim, then, is to enable the child to read in map, write in map and think in map. Therefore, introduction to map work must be made in this stage. For instance, the idea of a scale and its application and its use must be told to the students of the elementary school. Simple plans based on the understanding of the meaning of the scale may got be prepared by pupils.

5. **Physical geography and Principles of climate.**—The principles of climate determine the

natural regional method of teaching geography in the senior course and the primary or the elementary school syllabus is only a preparation for the senior school therefore sufficient gróund must be covered in this branch of geography. To make the foundation strong, principles of elementary weather should be taught and explained by means of examples or models. This implies nature study in the junior classes.

6. **Exigencies of time-table and staff.**—Such limiting factors as the amount of time available and the number of teachers on the staff must be taken into consideration. Geography is a practical subject with its own methods of teaching and therefore, sufficient time is needed for its thorough study. The time allotted to this subject in the elementary classes is from 60 to 100 minutes per week.

7. **Local conditions of climate and environment should also be considered**—All students are not brought up alike and their social and physical environment considerably varies. Therefore these things must be borne in mind. There is no universal key which can open the different locks of geography course.

8. **Local geography** should form an important part of the contents of the primary school syllabus, because local geography prepares the ground for the senior course. Besides, a child is more interested in his own land than that of others.

9. **Human geography.**—Everything should be taught according to its bearing on human activities. It is because human geography limits the vast scope of geography for school purposes. We must explain the action and interaction of man and nature, because this is the conception of modern geography. In teaching this geography descriptive and narrative methods should be adopted. The importance of man in conquering nature must be stressed.

10. **Practical work.**—The hand and eye should serve a useful servant of brain. Therefore, pupils must be acquainted with the elementary instruments of weather. They should be given practice in taking readings from the thermometer and the barometer. They should also be able to make use of a rain-gauge.

11. **The particular point** to be stressed at a particular stage and the particular method to be followed must be noted and made clear.

12. **Needs of the pupil.**—The teacher should always try to adopt the lesson to the needs of the child. Efforts should be directed to group together a number of related facts rather than to present them in isolation.

CONTENTS OF THE PRIMARY SCHOOL SYLLABUS

A critical study of the principles of selection of a syllabus will reveal that the whole elementary

school course can be easily classified under the following heads :—

1. Human geography. 2. Homeland or people and continents 3. Weather observation and Physical geography 4. Map-work.

Let us study each in detail and then frame an ideal syllabus for the primary class.

1. HUMAN GEOGRAPHY

The syllabus should aim at preparing the pupil for citizenship. It should make him realize the interdependence of races and communities. Thus it is a means to an end. It is an instrument of providing material for the broad study of the mankind. The function of geography teaching is cultural and not academic, therefore, everything is to be learnt and taught from the human point of view. It should bring him in direct contact with the life and activities of the human race. Not only that but it should also bring to the knowledge of pupils the existence of both the most backward and the most advanced nations, their efforts to conquer nature and the results and achievements of their struggle, and finally their social, political and economic progress.

We study everything from the child point of view because child has to spend his life into a world of diverse human beings. He has to establish new relations with other citizens. Consequently, he must develop the spirit of 'give and take' and of 'knowing and feeling, actions of others.

The teaching should be so adopted as to meet the needs of such a social child who has to utilize his

leisure in the company of other human beings. The teaching of geography should be a means to an end. That end is the life of a true citizen. The child must gain something so as to ennoble his life by improving his own standard of living and that of his nation in which he lives. To the intelligent grasp of economic, political and racial problems of the world, geographical knowledge would greatly help. This will then impart right vision and thought because human geography is one of the foundations of the science of collective living on the earth. So we should include such portions of human geography which should meet the above demands of the child.

2. HOMELAND AND LOCAL GEOGRAPHY

Under normal conditions only one area can be studied in detail by school children. This is the local area because it is the nearest of all. It forms a basis for extension to the study of other parts of the world.

This home region or local native land of the pupil is best learnt by direct method, *i. e.* by exploration and observation. Children have these instincts very strong at this stage and therefore they should be utilized in full.

After pupils have observed facts, they will represent them in the from of maps and diagrams and will thereby acquire the power of imaginative reconstruction through which they will imagine conditions of life in other parts of the world. This group exploration will develop the sense of co-operation and citizenship. In this way a real love for home district

will take its birth in the child. So this is how Regional geography is to be taught. In many places local industries sometimes give a very good start for a geography lesson. In this we should trace back the finished product to its origin. Again the lesson on a port may have its origin from its trade. Another method is to trace back to its origin every article brought home from the retail shopkeeper. It will help them to feel that they are parts of a larger world. It should be remembered that in teaching the local geography to young pupils we are not to follow the regional method but those of narration, description, excursion and observation.

The teacher should have two aims in view in the teaching of local geography : (1) to emphasize the influence of site and location on the lives of natives ; (2) to show the influence of contacts made with the near and distant neighbours and to extract the development of the native inhabitants.

One important question that faces a geography teacher of the primary class is how to link this study with that of the sub-region. The best way is to send out students to the neighbouring districts. It is because the neighbouring district is as much a foreign country as India or Europe. Thus students of Lahore may visit districts of Gujranwala or Gujrat and *vice versa*. In this way home district becomes a background of reality which will facilitate the formation of a true picture of distant lands.

We also start teaching the regional geography of the Punjab in the 4th class, because this is the most naturally suited place for its inclusion. It extends the notion of man's relations to his geographical environment beyond his daily life. Pupils will, then, understand the meaning of the terms like cultivation, textile, industry, ploughing, irrigation, reaping, harvesting, spinning and weaving.

The teacher will realize that his early work in the home district and homeland (Punjab) will greatly serve as an introduction to the principles of human geography which is defined as a "*response in human activity to environmental conditions.*" Secondly, with the teaching of local geography (home district and homeland), pupils will form some ideas of regionnal geography, which is largely based on physical conditions. Striking contrast may be made between the eastern Punjab and the western Punjab.

3. WEATHER OBSERVATION AND PHYSICAL GEOGRAPHY

Observational work which has already been started in the kindergarten class will play an important part in the primary class-work and onwards. Therefore nature-study becomes indispensable. As soon as the points of compass are followed, pupils may read the weathercock and record the direction of the winds. They may even construct a wind-rose. Rotation and revolution may be taught with the

help of a plasticine model of a man standing on a slate globe, which rotates before a lamp. While this topic is going on, the teacher may explain terms like, tropics, arctic circle and antarctic circle with reference to the position of the sun at the solstices. The terms Latitude and Longitude may also be explained.

The next point to be emphasized is to divide the globe into five zones of heat. Let the child place his hand first flat against fire and then sideways and he will pick up an idea about the amount of heat at different places.

As far as possible all instances that may arise in the course of teaching physical geography should be given from the study of local geography which will always accompany this.

Slate globe is a very good instrument for teaching physical geography. In the first place, children will learn from the slate globe the names of continents and oceans and they will pick up examples of islands, bays, isthmuses, and peninsulas by relating them with their own models which have been prepared with reference to examples in the school locality. The slate globe will also facilitate the understanding of the movements of the earth. Even such abstract terms as Axis, North and South poles and the Equator will also be easily understood. Once these geographical terms have been grasped the study of points of compass will not be a difficult thing. We can show how facing north and south means

facing north pole and south pole respectively. We can ask pupils in what direction lie India, Japan or America. In order to give reality let children draw a line on the floor at noon along the shadow of a stick fixed vertically on the ground. This will give them South direction towards the sun and North away from it. A right bisector of this will give East and West line. Their intermediate directions *e.g.*, N. E. and N. N. E. etc., will not be difficult to draw. The next task will be to orient the objects in the class-room *e.g.*, doors, windows and almirahs. Then go out of the room and orient the objects of the field *i.e.*, entrance gate, hostel, head-master's office etc. After this, eclipses may be taught with the help of two balls.

With the passage of the time and with the growth of observations made, the teacher should illustrate with concrete examples the directions and kinds of the winds prevalent in the region at different times of the year. They may also learn the elementary principles of weather. At intervals pupils may be asked to measure the height of the midday sun and they may also note the time and directions of sun-set and sun-rise.

It will be a good practice if the teacher encourages them to maintain a weather record. This will teach the general principles of Physical geography. After, the directions have been learnt the causes of wind and rain, next be dealt with by referring to the rise of burnt scraps of paper after they are heated over the fire. The draught between

the open air and the fireplace is a first hand example of the movement of winds. Similarly, we can proceed to the principle of water cycle with reference to daily observation by the pupils as e.g., the drying of clothes. This will give them the meaning of the word, " evaporation and condensation ". The resultant formation of clouds and rain may be illustrated from the boiling of water in a kettle and the deposition of drops of water when ice is put in a tumbler. The teacher should point out how rivers are fed by rain and rivers in turn feed the sea from where water is evaporated by the heat of the sun forming clouds and thereby you complete the water cycle. As far as possible, all quotations should be made with reference to the study of homeland which would always accompany this work.

The causes of rain will lead on to its results and we should then proceed to the study of the work of rain and rivers. Terms like water-parting, spring, and erosion are best learnt with the aid of models, pictures and other illustrative material. The working of a spring is best illustrated by putting a layer of sand (porous) on the top of plasticine or clay layer. To illustrate the erosive work of a river muddy water may be collected and the sediment be allowed to settle. The formation of a delta may actually be prepared on the ground. Tides and estuaries may also be treated at this stage. The class should be explained how the rising and falling tides help the incoming and outgoing ships. It is advised that the

teacher must have surveyed the local area and thus he should present its teaching in the form of a series of maps and models.

4. MAP-WORK

Along with the work on the slate globe will go exercises in map-work. These will consist of simple description of the school locality for locating the cardinal points for elementary map-drawing. It is a usual plan to introduce children of urban areas with 25″ to a mile or 6″ to a mile map of the local district.

In fact we introduce pupils with a map when they have been able to recognize the geographical terms from the slate globe in relation to the models prepared by them. This will help them to know the meaning of the map which *is a representative of the shape of the object when looked flat.* The easiest way to proceed is the following. Draw outlines of desks or tables on the floor of the class room and remove these tables and insert the word 'desk' in between the outlines, the resultant figure will be a map. If the figure of the outline of the table or plan, as it is called, be reproduced on the black-board and pupils be told that the diagram drawn on the black-board is much smaller than that drawn on the floor then, the whole matter becomes quite clear. Similarly the teacher can explain that the outlines of continents drawn on the slate globe are merely flat pictures of the continents. The next step is to distribute among pupils outline maps of the Punjab drawn on a scale of 1″ to a mile and to

explain them the convention by which North is put at the top of the map. Then exercises may be given to show the direction in which Lahore or Amritsar lies.

Another thing to be taught in connection with the map work is the meaning of the word 'scale' and its use. We have already explained that a map or a plan is always smaller than the area it represents and shows distance in addition to direction and shape. This is known as scale meaning thereby that *the distance on the ground measured in miles or yards or feet is represented on a paper or map by a length drawn in inches or centimetres only.* To cut short, it shows miles or feet expressed in inches. In order to make it more effective let pupils prepare a plan of the class-room and the school on some convenient scale. In order to add life to it some exercises be set on time-scale. For instance, how much time you will take in coming from your home to school moving at a particular speed. When the plan of the school locality has been prepared let them fill in important features like rivers, hills and coastal features and identify them on the map and fill in their names. So much of the map-work is dnite sufficient for the primary class.

IDEAL SYLLABUS FOR THE PRIMARY CLASS

The whole syllabus is divided into 3 parts:—

1. **Weather observation or nature-study.—**

It consists of nature-study relating to the following :—

(*a*) To know the points of compass.

(*b*) To record the direction of permanent winds blowing in the region.

(*c*) To prepare a windrose.

(*d*) To maintain a weather record.

(*e*) To measure the sun's height at different times.

(*f*) To study the conditions of weather at sunset and sunrise.

(*g*) To measure rainfall, temperature and atmospheric pressure.

The theory portion is taught with the help of slate globe.

2. **Physical geography.**—

(*a*) Causes of winds and rain.

(*b*) Water cycle and condensation.

(*c*) Work of rain and river.

(*d*) Springs.

(*e*) Tides and estuaries and their uses etc.

The whole course in physical geography is to be taught with reference to geography of the Punjab. The geographical terms which may arise in the study should be taught with the help of models and pictures.

3. **Regional geography or People and the world** :—teaching home district and homeland (local geography).

(*a*) Geography of Lahore.

(*b*) Geography of the Punjab.

The methods to be followed should be descriptive, observational and excursive and should be accompanied by models and pictures.

READING SCHEME FOR THE REGIONAL GEOGRAPHY

1st Primary Class. **Folk-tales of all kinds.**—These tales should present sufficient geographical colouring and background. These stories should be such as may be read by children themselves as well as those to be read out by the teacher to the class.

2nd Primary Class. **Stories of the animals of the world.**—These stories are recommended because animals reflect the geographical environment to which they have adopted themselves. Besides, animals are of great interest to children at this stage.

3rd Primary Class. **Stories of the people of Lahore and the Punjab.**—These stories should describe typical persons having supposed names like Ramu the farmer and Raju the miner. These should be written in a descriptive way teaching the dignity of labour.

4th Primary Class. **Stories of the people of India** depicting the various geographical environment to which man has adopted himself.

In short, the Geographical Reader should be readable and should produce a geographical atmosphere. It should, in the main, tell a story only, the lesson of geography is a secondary thing. The primary object is to cultivate geographical interest.

Books, as suggested above would, then provide the geographical information needed by pupils of the primary classes, as well as human sympathy and understanding.

SUMMARY

The drawing of a syllabus is always governed by certain principles which in their turn determine the methods of approach to the subject. These principles are :—

1. *Aim of the education.* This is always determined by the State or the governing body.

2. *Mental capacity.* This means the inherent faculties that a child possesses, *e. g.* memory and five senses. These are the instruments through which the ultimate aim is achieved.

3. *Intellectual development or Mental stage.* All chilldren are not equally developed mentally, therefore, the teacher has to look to needs of pupils before giving a lesson.

4. *Map-work.* This is the chief instrument of learning and teaching.

5. *Physical geography.* This forms the foundation on which the super structure of regional geography is built. Therefore, understanding of the principles of geography is most essential.

6. *Time-table and staff.* In some schools there are separate teachers of history and geography while in other schools the same teacher teaches many subjects. The time allotted to teaching of this subject is 60 to 100 minutes per week. These things must not be overlooked.

7. *Local conditions of climate and environment.* Ours is a tropical country, therefore outdoor work is handicapped in summer.

8. *Human geography.* This limits for school purposes the vast scope of geography. We teach everything of the subject from the human point of view because child has to spend his leisure time among human beings.

9. *Practical work.* This is essential to make the teaching effective and lasting. Besides, the hand becomes a servant of the brain. It also teaches dignity of labour.

10. *Particular points* in the syllabus must be stressed because all facts are not equally important.

11. *Local geography.* Its teaching is most necessary because it prepares the ground for the teaching of world geography.

12. *Nature of the pupil.* The teacher must consider the nature of the pupil in teaching the subject.

The geography syllabus should consist of the following parts :

1. *Human geography.* This is taught to develop human sympathy and understanding so that he may find out solution for social, economic and political problems.

2. *Home geography.* This is the easiest way for the extension of geographical knowledge of pupils. The neighbouring environment is the surest means for giving a touch of reality to pupils.

3. *Weather observation and Physical geography.*

Elementary principles of Physical geography are taught through nature-study. A strong foundation means a strong building.

4. *Map-work.* Only elementary groundwork is done as a preparation for independent study of a region by a pupil with the help of a map.

Broadly, syllabus should contain the following :—

1. An elementary knowledge of geographical terms, *e.g.* mountain, sea, island, bay, etc.
2. Meanings of a map or a plan.
3. Geography of the province and the local district.
4. First principles of world geography.

QUESTIONS

1. Estimate the importance of local material in the teaching of geography at various stages. Illustrate your answer. (*P.U.* 1940)

2. Draw up an outline scheme of teaching Physical geography in classes III and IV.

3. At what stage should the teaching of geography begin and how ? Draw up briefly the syllabus for the primary classes and criticise the existing primary syllabus of your province.

4. What is the importance of home geography in teaching general geography ? What topics would you include in the study of home geography ? (*P.U.* 1942)

5. Why is it necessary to emphasize facts in the teaching of geography ? How would you select and emphasize these facts ?

6. What suggestions would you give to a young teacher regarding the spelling and pronunciation of geographical names ?

7. What use would you make of a slate globe in a primary school in teaching geography ?

8. What are the principles that must be kept in mind while planning a geography syllabus ?

(P.U. 1945)

CHAPTER IX

SYLLABUS IN SECONDARY SCHOOLS (MIDDLE AND HIGH)

Introduction:—Now-a-days educationists are crying for a scientific curriculum. Therefore the attention of the geography teacher is focussed on the major principles of geography which must be grasped by pupils of secondary schools. This will ultimately lead them to the appreciation and understanding of the major problems of their environment. Such a scientific curriculum will make them alert and will induce them to search for remedies. This will, then, make them true citizens and true patriots.

Let us study the principles which should govern such a scientific syllabus.

PRINCIPLES OF SELECTION

1. **A complete syllabus.**—The syllabus should be, in the first instance, both complete and well-balanced. This is possible if the following points are borne in view:—

(*a*) The whole world must be studied.

(*b*) While no region of the world should be excluded, the important parts should receive the greatest attention.

(*c*) No specialisation in the school geography be introduced.

(*d*) Map work should receive proper emphasis.

(*e*) Practical work should continuously be maintained.

2. **Mental capacity.**—This point is very important to note as the work of geography teacher is likely to be affected by the mental capacity of the pupil. The teacher must know the apperceptive masses possessed by his pupils, because the syllabus has to proceed from the child in the cradle to the man of the world at large. It is this mental capacity that will control the rate of progress of the teacher. At this stage there is much development of such powers as of analysis of generalisation of considering one fact in relation to the other and of making one's own conclusions.

3. **Intellectual development.**—Children are unequally gifted intellectually. Therefore it is necessary to find out, if possible, how far children differ in the intellectual equipment. Some of the mental gifts demanded of them are :—

(*a*) A fund of geographical ideas, *e. g.*, shore, sea, ship and town.

(*b*) Power to imagine things in the absence of concrete objects, a forest or a desert.

(*c*) Ability to arrest several facts or ideas with respect to topic in hand

(*d*) Ability to use general terms. Latitude, vegetation, communication and ocean.

(*e*) Ability to reason out things.

4. **Educational principles.**—Syllabus should also be founded on educational principles.

5. **Limiting factors:**—Certain limiting factors must be observed. There is always a university examination at the end of the middle course, but to examination should not be allotted the domineering position. Only the average teacher and the average pupil determine the standard of achievement.

6. **Exigencies of staff and time-table.**—This is a practical subject, so it demands an adequate time. The minimum time allotted to this subject in the middle and high classes is three periods of 40 to 45 minutes per week throughout the course or 1/12 of the time of the whole curriculum.

7. **Particular methods to be applied.**—While syllabus is being prepared it is necessary to know as to what portions of the subject matter lend themselves to different methods of treatment suited to the particular mental stage of the pupil. In geography some topics can be better treated than others. For example, West Africa, although economically and culturally more backward than New England, yet it is the most suitable topic for geographical study because of its contrasted climate and vegetation and its intrinsic human interest and its recent progress.

8. **Aim of the governing body.**—Senior school course in geography is determined by what is covered in junior school. The teacher generally

has the following aims to be satisfied with geography curriculum :—

(*a*) It is hardly true to say that the school work should awaken the child's interest because child is much interested in geographical topics. Geography should also open new channels for research and develop new tastes.

(*b*) Factual knowledge is also expected of a matriculate student. For instance, a child should know names, shapes and relative positions of continents. Some facts about the production, trade and transport are also desirable.

(*c*) The pupil should also understand certain geographical terms as mentioned before.

(*d*) The students of high class must understand certain general conceptions, *e.g.* hot and cold, distance and height and amount of rainfall.

(*e*) Pupils should also be able to read a map and also to draw a map. These are important tools which are even used after school life.

9. **Local conditions of climate and social laws** :—Social conditions vary all over India. It is, therefore, essential that the pupil should understand the needs of his society and study the geography of the region from that point of view.

CONTENTS OF MIDDLE AND SECONDARY SCHOOLS SYLLABUS

The middle and secondary schools syllabus is divided into three parts :—

(*a*) Map-work, (*b*) Weather observation and Physical geography, (*c*) Regional geography.

I. MAP-WORK

In the junior classes we conveyed the meaning of the words *map* and *scale*. We also set some exercises on their application. Henceforward we shall begin map-work for teaching relief. Before taking up the contour lines as the method of showing relief, heights may be shown by shading. There are various methods in use to teach this difficult topic on contours :

(1) Take a wooden model of a hill. Draw its contours and fix it on a central peg. Draw the outline of each section of the contour on a piece of paper passed through the central peg.

(2) Take a photo of a contoured model of local area known to the pupils. If this photo is coloured in original it will turn out to be a contoured map.

(3) The most reliable method is to throw the picture of a contoured model on a screen by means of an epidiascope. Its appearance will be exactly that of an ordinary coloured atlas map.

An attempt, then, be made to draw sections from the given contours. In order to explain this the teacher will cut vertical slices of the contoured model. Sufficient practice should be given in this

connection. In the early stage, section of simple features should be drawn with the help of vertical and horizontal scale, e.g. across a conical hill, a valley, a dip slope.

Another topic related to contours is to read a map. Ground be prepared for this before actual reading of the survey map is taken in hand. The teacher may ask pupils to draw the relief of the country through which they have passed while on excursion. Pupils should be insisted on to make use of the key to the layering.

In the 9th class or early 10th class some easy exercises in surveying may be set. The school playground may be surveyed by taking offshoots from the base-line with the help of optical square. Distances may be measured with the help of the chain or tape. Use of field-book may also be explained. Then a fair plan be prepared from the data entered in the field-book.

The last concern of the teacher in connection with map-work is the introduction to ordnance survey maps and their reading. Only elementary portion of this topic should be attempted in the school course.

II. WEATHER OBSERVATION AND PHYSICAL GEOGRAPHY

There are two plans with regard to the teaching of physical geography. In some schools physical geography is started from the 5th class and is continued up till the end. Another alternative plan is to postpone the whole of physical

geography to 9th and 10th classes. The former plan is preferable. Therefore, from the 5th class and onwards we should begin to discuss the work of ice as an agent of erosion. We may also describe the phenomena of volcanoes, earthquakes and geysers. At a still later stage broad principles of physical geography may be taught, *e.g.* the shape of the earth, its rotation and revolution, day and night, seasons, latitude and longitude, time and its relation to longitude. These topics are postponed to the high classes because they are difficult as they involve some mathematical knowledge. When a sufficient knowledge about the composition of the earth's surface is gained, rocks may be introduced. Similarly the elementary study of oceanography like waves and currents may also be included. It is earnestly demanded that the principles of climate on which the superstructure of regional geography is based must be thoroughly grasped. For these reasons, the distribution of pressure and winds in the world forms an important feature of the course.

As the course proceeds in the senior school, pupils will be able to take larger number of weather observations. The work should be started with taking records of temperature and pressure and, at intervals, of rainfall too. Let these records be posted on the notice board and graphs and other statistical diagrams may be prepared to show the daily and annual variations. This maintenance of records should lead to the study of weather maps

and forecasting. The practical work is profitable only if pupils can generalise broad principles, *e.g.* a sudden fall in temperature is associated with a heavy rainfall or a marked change in pressure with a change of wind.

III. REGIONAL GEOGRAPHY

Once the junior course is finished we have to direct our attention to the treatment of continents with increasing stress on the regional method. In these five or six years the study of India is specially emphasized against an outline study of the world as a whole. As the regional geography of Europe and N. America is very complicated, it is advised to postpone their teaching to the latter part of the course. Under these circumstances the three southern continents are taken earlier.

That the whole world must be taught is now agreed upon as most essential. World being so vast it becomes difficult to decide as what to teach of the world geography, particularly in view of exigencies of the time-table and the examination. Before entering upon the teaching of the geography of individual continents it is suggested that the world be studied in outlines, particularly, from the point of view of human and economic geography. Such a step may be termed as the final stage of the transition period or the beginning of the Regional stage. This will serve three purposes :—

(1) It prepares a background for the regional treatment of the continents by presenting a picture of the world of which they form a part. Pupils

will come to know the relative positions of the continents and their broad characteristics. This knowledge will greatly help in the study of individual continents.

(2) It will level up the knowledge of the class about the world.

(3) It will awaken the interest of the pupil in the world around. So far the child has been focussing his attention on his immediate surroundings

In order, then, to give an introduction to the world an approach may be made by any of the following ways. It may be taught through the lives of the people or through tales of travel or it may be through pupil's daily needs of food, clothing and shelter and the means adopted to satisfy them.*

When the world study in outline has been introduced, each continent should be studied individually, in relation to other continents. For example, Asia continues into Australia in the south and into Europe in the west. Consequently these combined continents are also known as Australasia and Eurasia, respectively.

Different teachers follow different order of treatment of the continents. As suggested above and as directed by the mental stage of the pupils, three southern continents should always be taken earlier than Europe and North America. A word of caution is necessary with respect to the amount

*For concrete example of the introductory course see back the portion on Regional scheme of the primary school course.

of attention to be paid to details in the regional study of the continents. Broad generalisations will not be possible in the junior course but are a necessary element in the senior classes.

The most important thing to be noted in the regional study is to draw the attention of pupils to the underlying geographical principles, specially the effects of relief, mineral resources and climate and soil in developing a great diversity in the occupations of man and in his standard of living. Such real problems of the world can only be attacked by senior students and not by junior pupils, who only study the direct forms of human response.

ORDER OF TREATMENT IN THE REGIONAL STUDY OF CONTINENTS

The order of treatment of the world is extremely varied. In most cases the study of India precedes and forms the bulk of first year's course. In other cases Eurasia is taken in the 9th class, while the southern continents and N. America are taken first. Another plan is to study N. America in detail.

There also exists a concentric plan by which the same ground is covered in successive years with different emphasis and in greater details. The following plan based on psychological grounds is sometimes followed in many secondary schools.

*COURSE A

1-4 years.	1. The Preliminary stage. (a) Home district. 2. The Transition Stage. (a) Extension of the home district. (b) Home-land (Punjab). 3. Regional stage.
5th class.	(a) Introduction to the world and India in relation to world in outlines.
6th "	(b) Southern continents.
7th "	(c) N. America and Asia.
8th "	(d) Europe and British Empire.
9th "	(e) India in detail and world in outline.
10th "	(f) Study of the world as a whole from examination point of view.

Another plan based on logical grounds is also suggested.

COURSE B

1-4 years.	1. The Preliminary stage. (a) Home district.

*After Memorandum on the teaching of geography—Philip.

2. The Transition stage.
   (*a*) Extension of the home district.
   (*b*) Home-land (Punjab).

3. Regional stage.

5th class.	(*a*) India in relation to world in outlines.
6th ,,	(*b*) Americas.
7th ,,	(*c*) Asia and Australia.
8th ,,	(*d*) Africa and Europe.
9th ,,	(*e*) India and world.
10th ,,	(*f*) Study from the examination point of view.

In course A the choice of three southern continents is based on relative simplicity of the physiographic structure and on its division into equal number of climatic provinces and also on the fact that economically, culturally and socially they are equally developed. Besides, pupils are very rich in memory, therefore full use should be made of this gift. For instance, pupils can very easily memorise facts such as, rivers, towns, lines of communication, minerals and cultivated crops. In the following year less recourse is made to memory work and, therefore, study of N. America based on climatic divisions is taken in hand. Then the treatment of world continents concludes in the 8th or 9th class with the study of Eurasia, because at this time pupils can appreciate the complexity of physical, economic and human geography.

Most teachers prefer the course B. In this plan the world is divided into North and South zones. North and South Americas are taken together in the same year ; Asia is studied with Australia and Africa with Europe. One merit of this plan is that major climatic regions are treated every year in greater details of the underlying principles.

SPECIMEN SYLLABUS OF THE MIDDLE AND HIGH SCHOOL

I. **Physical geography**

A. *Lithosphere* :

(*a*) Ice as an agent of denudation,
(*b*) volcanoes,
(*c*) earthquakes,
(*d*) geysers,
(*e*) rocks,
(*f*) shape of the earth, rotation and revolution, day and night and seasons,
(*g*) latitude and longitude ; time and its relation to longitude.

B. *Hydrosphere.*—Ocean and its movements, waves, currents, tidesand their effect on climate and trade.

C. *Atmosphere.*—Distribution of temperature, pressure and winds, land and sea breezes, monsoons, trade winds and westerlies, their courses and effects and climatic zones.

II. **Practical and map work.**

A. 1. Introduction to scientific apparatus likely to be used in the course of study, e.g. thermometers, rain-gauge, and barometer.

2. Taking observations from these instruments and keeping records.

3. Representing statistical data in the form of statistical diagrams—curve, wheel and bar diagrams.

B. 1. Making a map on a given scale.

2 Study of contours and drawing sections from them.

3. Introduction to ordnance survey maps and doing exercises on them.

4. Introducing pupils to the simple process of map making by surveying.

5. Introduction to map symbols.

III. Regional Geography

5th class.	India and world study in outline based on historical geography.
6th class.	Africa and South America (because of similar conditions)
7th ,,	Australia and Asia (Including India).
8th ,,	Europe and North America.
9th ,,	India in relation to world and British empire emphasizing economic and political development.
10th ,,	Revision and solving University questions and study from the examination point of view.

*The Punjab Education Board revised syllabus and the Bombay Presidency School Board syllabus are given in Appendices F and G.

SUMMARY

The modern trend is towards framing a more human and scientific syllabus based on the following principles :—

1. *Syllabus should be well balanced and complete.* Most children finish their studies after matriculation stage and do not go in for higher education. Therefore our school syllabus should be as far as possible, complete in itself.

2. *Mental capacity.*—By now pupils have acquired the habits of reasoning and drawing conclusions. Our study should be based on these mental faculties.

3. *Intellectual development.*—Children coming to school are at different mental stages. Therefore the teacher should bear his rate of progress with respect to the average child.

4. *Educational aims* must not be overlooked.

5. *Limiting factors* should also be cared for, *e.g.* university examination is held at the end of middle course.

6. *Exigencies of staff and time-table-.*—Sometimes there is the same teacher for science and geography. Besides the time allotted to geography in secondary schools is 3 periods of 40 to 45 minutes per week.

7. *Important points* must be emphasized at the required stage.

8. *Aim of education* is also a determining factor.

9. *Local conditions of climate and local needs of the society* must not be overlooked.

We should base our study on the needs of the society to which the pupil belongs.

The secondary school syllabus is divided into three parts :

(*a*) **Map-work.**—It ranges from map-making to map-reading. Pupils should learn the various methods of showing relief, *e. g.* contours and hill shading. Even elementary surveying with the help of optical square is also included. Similarly reading of the ordnance survey map is also required at this stage.

(*b*) **Physical geography and weather observation.**—Work of ice, earthquakes and volcanoes, rotation and revolution of the earth and their effects, latitude and longitude and their relation to time are few topics included in this portion.

Making observations of temperature, pressure and measurement of rainfall are to be done practically. Pupils should maintain weather records in order to lead themselves to the study of weather maps.

(*c*) **Regional geography.**—All the continents are to be treated individually. India should receive special emphasis and therefore, it needs to be treated both with respect to world and the British empire. The following order of treatment is recommended. In this the three southern continents are taken earlier because of their simplicity.

5th	class.	India in relation to the world.
6th	„	Africa and South America.
7th	„	Australia and Asia.
8th	„	Europe and North America.

9th class	India in relation to the world and British Empire.
10th ,,	Revision and study from the examination point of view.

QUESTIONS

1. What principles will you bear in mind while preparing syllabus for middle and high schools? Criticise the existing syllabus of the Punjab Education Board for the middle schools? (*P. U. 1945*)

2. Discuss the importance of map work in the middle and high schools. Show how and to what extent you will teach the map work.

3. Draw up an ideal syllabus for middle classes, giving reasons for the inclusion of any topic.

4. What test would you apply to determine whether this or that particular topic should or should not be included in the geography syllabus? How far would you include structure, soil and climate in teaching geography?

oud15. How w you give your pupilsan idea of

contours?

6. (*a*) What exercises do you suggest in Practical Geography, for the middle classes of the school?

(*b*) What use would you make of a weather observation record in teaching geography?

(*c*) What are the various ways of approach for the study of the peoples and continents (world geography) in Junior classes, which do you prefer and why?

(*d*) In what order would you teach continents in the middle classes?

CHAPTER X

METHODS OF TEACHING GEOGRAPHY

Geography has undergone a great change at the present times. It was the most unpopular subject some time back, but to-day it is growing in importance every day. To-day it touches all the subjects of the school curriculum, both physical sciences and humanistic studies. It is taught with some definite aims and objects. For this purpose it is not out of place to write down the following definition of the subject. " Geography is a unifying science ; it draws its raw material from other sciences and studies ; it deals with the material in its own way, seeking and discovering the interrelation of phenomena and the interaction between man and those phenomena. Man in relation to his environment is its special view point and its particular instrument is the map ". Now, aims determine the methods of teaching the subject, because an aim can only be achieved through the practice of suitable methods. In order to be successful in the fulfilment of aims and objects of teaching geography, the following modern methods are recommended :—

1. Observation method. 2. Excursion and Journey method. 3. Laboratory method. 4. Project method. 5. Regional method.

Let us study each method one by one.

1. **Observation method.**—A real impression of an object or a plan can be gained through personal observation only, because the process of learning consists of two stages—(*a*) seeing or doing and (*b*) thinking. Direct experience is an essential step to right understanding By observation and action one gains the first hand impression of an object. Then by thoughtful enquiry either consciously done or directed by some purpose the first impressions are changed into ideas of the properties of the object. So one begins to form a world of ideas from one's world of experiences that one gains. Then, by permutation and combination of ideas and by constructive thought one forms the conception of things and events.

Thus it is clear that in the study of geography in particular and other subjects in general direct experience is the foundation stone for the building of super structure of the knowledge Consequently experience plays a double part, (1) as a basis for imagination to work on and therefore experience should offer a rich, varied and extensive stock of impressions, (2) as a basis for the formation of general conceptions which facilitate understanding.

So in teaching geography observation method and exercises based on it must form the essential foundation for a part of the learning if not for the whole. Therefore, pupils should be made interested in local environment by allowing them to go out and to observe the actual process or phenomena,

e. g. pupils may observe the surrounding rural and urban areas very keenly. Let this information gathered from the local environment, serve to make them understand similar conditions in their province or country or world. It is most desirable that the observational work of the pupils should be carefully directed and guided by the teacher, because pupils are too young for this purpose yet.

Pupils may be made to gather information by observing the following sources :—

(*a*) **Museum.**—A museum is a great institution of learning by observation. A school museum is very invaluable in bringing home to every child the close connection between school lessons and every-day life. It should be the special concern of the geography teacher to own a geography museum of the school. There is a very large variety of objects which can be kept in the museum but among the more important classes of objects we may note the following.

(i) Pictures and picture post-cards, illustrating the lives of the people in other lands.

(ii) Models, either made by pupils or obtained from the bazar.

(iii) Articles of local manufacture—such as cloth, pottery, brass and other metal and lac work, painting.

(iv) Specimens illustrating agriculture of the country—rice, oil-seeds, wheat etc.

(v) Different kinds of rocks and minerals with labels attached to each.

(vi) Foreign stamps and coins.

(*b*) **Demonstration.**—Pupils may be made to observe the experiments performed by the teacher and to draw inferences from them. Some of the topics which lend themselves to practical work are phases of the moon, seasons, day and night, condensation, currents, convectional rainfall etc.

(*c*) **Maps.**—These are essential tools of the teacher. By these means the teacher can focus the attention of the whole class and can illustrate better than by oral description. Pupils may be asked to observe the water courses and land forms or the topography of the region. Although maps are limited in scope, yet they are invaluable. Similarly, outline maps or plans may be used to explain scale, direction and position. Distributional maps, survey maps, statistical diagrams and models can also be conveniently employed, *e.g.* a wheel diagram or bar diagram may be prepared to illustrate the trade or production of a country or countries or graph may be used to show the variation in temperature, pressure and rainfall. Then again, class-room sketches prepared by the teacher can serve a good ground for observational work. It should be noted that the best diagrams are those which are prepared in the class and in the presence of the pupils.

(*d*) **Pictures.**—Geography should not only teach to think in shape but also in pictures. A single well selected picture makes the topic far clearer than a voluminous description. It is not easy to describe a glacier to a person who has never seen it. Pupils may understand the causes and

effects of the formation of a glacier but they will not be able to appreciate its size, its appearance, its colouring and its setting, while a picture of a glacier will enable them to do so to some extent. The teacher should seek the cooperation of the pupils in the collection of the pictures. Even advertisement and cigarette cases may be utilized by younger pupils. These pictures may be mounted on a card-board or plywood or tin. Let these pictures be classified in the following manner :—

(*a*) Town ; (*b*) Physical ; (*c*) Natural geography ; (*d*) Cultivated ; (*e*) Minerals and industries ; (*f*) People and their mode of living ; (*g*) animals.

Always keep an index of pictures. Pictures may be handed round the class or displayed by an epidiascope or a magic lantern. Pupils must be told what to look for because they require guidance and direction in this connection. It may be noted that description has to supplement the observation of the pupils. A picture, when displayed should be followed by a series of well arranged questions relating to the picture.

(*d*) **Cinematograph.**—Films are of great educational value to geography students. The still films are preferable for showing some process—the manufacture of cotton or the irrigation. Films may be borrowed for school purposes or arrangements may be made with the local cinema to show the film to pupils at concession rates. A cheaper substitute of the cinema is the magic lantern or epidiascope by means of which pictures

are thrown on a screen by preparing slides of glass. In each case the teacher should explain the pictures presented.

Thus, we have seen that observation method has a very wide range and can be very conveniently employed. It is one of the effective methods of teaching geography. It is so common that it forms a part of the general method of teaching geography lessons.

2. **Excursion method.**—An excursion arranged for the study of a part of country on the spot is the most useful method of teaching geography. Excursion presents the object in its natural colours. It is the best way to study geographical facts as they are. These excursions serve a very useful purpose in the formation of character of a pupil so that he may not be a misfit in the society. A wise teacher can have many opportunities of paying visits at least to local places if not to distant areas. When pupils are taken out, they may be encouraged to observe carefully the physical phenomena and the social, economic and industrial conditions. The easiest and the most important thing to observe is the natural objects like the landscape, scenery, land formations and different types of soils. A journey to a hilly area, to a river or sea-side may explain terms such as erosion, deposition, shells, grade, u and v shaped valleys, etc. Similarly a visit to a zoo may show the distribution of plants and animals. Thus a teacher can come across with a varied material for the teaching of phylsica

geography. Local journeys are as useful as travelling in distant lands, because a neighbouring town is as good a foreign country as any part of India. Other places of interest for visits are the industrial and rural centres, factories, railway-yards and railway stations. The visit to these places will greatly help in the study of regional and economic geography. Similarly mines and mills like the textile mill, oil pressing and sugar mills are as educative as the agricultural fields of the rural area.

The out-door observation work should be very closely correlated with the in-door work. The results of these visits may be expressed in the form of maps or geographical essays or stories and, if possible, in the form of relief models. Such visits or journeys not only enable the child to verify facts of class lessons and give reality but pupils know also things at first hand.

It is advisable that the teacher should see that the party or a trip is fully equipped and that it consists of a photographer, a musician, a singer and an incessant talker. The aim is that learning and laughing should go together The excursion method of teaching geography fosters such social virtues like co-operation, give-and-take and group feeling. Whatever excursions are carried out the success of an excursion partly demands careful preplanning and organisation of catering. It would bring creditable success if the teacher has been to the locality before it is visited by students and also

if the pupils are provided with maps of these areas.

A substitute of the actual journey is to have a talk with travellers of other lands like the Japanese, the English and the Americans, who should be induced by means of questions to relate their experiences.

Another alternative method is to read books on travel. It will be useful to mention the utility of such magazines as of the railway, steam, navigation and airways companies.

3. **Laboratory method.**—In this method pupils are active participants in the work. They are not mere listeners to the lesson but are compelled to observe carefully or to perform the experiments with their own hands. They are supposed to describe each step of performance and to make inferences from what they have observed or performed. In this method the pupil has to make use of either hand or eye or both. The object is to make the hand and the eye useful servants of the brain.

The word laboratory implies three things, (1) learning by doing, (2) learning by observation and (3) learning by discovery. The Laboratory method in a broad sense means the individual work done by a pupil as in the case of Dalton plan or Montessori method. The word laboratory is associated with the statement that the onus of learning falls on the individual.

The physical geography and map-work lend themselves mostly to this method of treatment, be-

cause the teacher or the pupil can perform, as in a science subject, certain experiments based on scientific principles to make the topic clear and illustrative. By performing such experiments the teacher tries to demonstrate the underlying causes. Just to give an idea, the following experiments may be quoted as an example :—

(*a*) To explain the causes of winds a lit flame may be placed at different places.

(*b*) Formation of clouds may be explained from the evaporation of clothes and by a tumbler containing pieces of ice.

(*c*) A magnetic needle may be used to show the directions of North and South.

(*d*) Rotation and revolution may be explained by rotating a ball round a lamp.

A word of caution may be mentioned here. When somebody is performing an experiment, it is most desirable that apparatus to be used should be tested beforehand and all experiments be rehearsed, preferably, under the same conditions, as those under which they will have to be shown. A calmness of attitude should be cultivated. Experiments should be striking, clear and convincing.

Another example of teaching geography by laboratory method may consist in the formation of models and making of maps of the things studied, e.g. human settlements, races, animals, trade of countries and occupations. Children may be encouraged to write accounts of geographical

journeys and excursions. This method is an excellent means of arousing enthusiasm.

4. **Project Method.**—A project is "a problematic act carried to completion in its natural setting." The project method is the expression of the revolt against the bookish method in which students were spoonfed with facts and information. A project is akin to real life and when scientifically carried out demands initiative, self-reliance, skill and patience. It is because obstacles presented by this method are those that may occur in one's real life.

Psychologically it is based on the principle of learning by doing. The child derives some satisfaction when he has achieved something. The project method is that which encourages the maximum amount of purposeful activity on the part of pupils. The second notable point about this method is that it employs senses and not mere words and symbols. Muscular activity is the essence of this method and consequently it may take some time ranging from a day to a year. It is also necessary that the materials to be used by pupils should be within their comprehension and means and that the project may lend itself to be completed within the given time. In this method every pupil shares the lesson in different phases and the method ensures sustained efforts on the part of pupils. The subject has a bearing on real life and there is no cramming at all. Lastly it fosters social qualities such as, co-operation and the spirit of give-and-take.

Projects may be individual or co-operative, large or small and they may be employed according to the mental age of the pupils. Following are some of the projects which can be conveniently employed in schools :—

Geographical projects may consist in the running of a vegetable or a cloth shop; cultivation or ploughing of a field; running of a house, a school, an agricultural farm, a post office, a railway station, a grocer's shop, a toy shop, and a stationery shop. Village and town markets are other geographical projects. Similarly pupils may prepare a weather record based on the climate of the local place. Another type of projects consists in the preparation of models of houses, school, local region, means of transport of one's province, railway station, wheat fields, hill station, etc. For senior students the following projects are recommended :—

(1) Making sand or clay models of different sections of various river valleys—the Ganges, the Indus, the Narbada or the Irrawadi.

(2) Life in various parts of the world—Tundra region, Desert region, Equatorial region or Grasslands. Pupils may be encouraged to stage a play showing the life in various regions of the world.

(3) A hill scene, *e.g.* Murree, Simla, or Mussorie, showing a railway line, a bridge, cultivated fields, roads and other important features, the human life, a post office or a church.

(4) Pupils may be asked to prepare economic and distributional maps of the local country. In

this case the teacher must be prepared to offer as much help as possible, particularly, in the collection of data from various sources.

(5) Setting or running of geographical museum is another important and useful project of educational value. Pupils should know how to run a museum scientifically.

(6) Pupils may be encouraged to read papers and organize excursions. Thus, the collecting instinct, which is most common among boys, is employed and not wasted.

(7) Pupils may cultivate a vegetable or a fruit garden. Let them cultivate the land and fence the fields. Let them also organize the sale and purchase of fruits and seeds respectively.

Sometimes efforts are wasted in an attempt to base the whole of geographical syllabus on projects. This is not practicable. One or two projects per class per month will do. Let these projects be spontaneous and neither too ambitious nor too advanced.

Thus, we have seen that the project method trains the pupil in the exercise of invention and self responsibility. The child gets training in research work. It also cultivates the social qualities and subordinates self to the common good. The greatest drawback in this method is that it is scrappy and consequently gaps are left. Besides, there is no provision for drill work.

5. Regional method. This is another method of teaching geography. It was Herbertson who gave

impetus to this method by dividing the whole world into a dozen or so broad climatic regions which are found in each of the great North and South land masses. Now-a-days the natural region method has become the most common and universal method in teaching the regional geography either of the world or individual country or a continent.

As defined by Herbertson, the major natural regions are based on differences of natural vegetation and exhibit to a great extent differences of climate. Geographers are of opinion that Herbertson's classification of the world can be used in a modified form. His classification is of great value in sub-dividing the continents and in analysing the factors which influence human activities. Those countries which lie within these climatic divisions may further be divided into structural zones.

In the study of aparticular region there is a considerable scope for a varied method to be employed. Some teachers work back from human efforts as resulted from the physical causes, while the usual plan is to make a start from physical geography. The following is the most common procedure which is in practice in schools :—

Location, structure, relief, drainage system and climate are first taken in a serial order and then pupils are led through the biological goegraphy of the region *i.e.* natural vegetation and animal life to its human geography, which includes the study of agricultural and pastoral occupations. After this, distribution of minerals and their exploitation in the development of industries are dealt with. This

is followed by a study of distribution of population, means of communication and the location of towns. Then finally, the region is studied in relation to other regions of the world.

The various natural regions of the world as suggested by Herbertson carry some drawbacks. It would be advisable if the following order of natural regions is followed :

(1) Arctic regions and hot regions.
(2) Tropical forests and monsoon lands.
(3) Temperate grasslands.
(4) Regions of Mediterranean climate
(5) Temperate forests.

It is desirable to begin with the region exhibiting the simplest and the most self-contained human life and proceed through the intermediate types to those that exhibit the greatest economic and political development.

In dealing with each region the progressive advance of man's civilization on earth must be stressed. The arctic regions present the most primitive type of a nomadic hunter while the desert lands are more advanced both economically and socially. Similarly, the temperate grasslands will show a primitive type of nomadic pastoral people. The American plains and African velds show the influence of settled conditions of mankind. The temperate regions present the greatest advanced society.

By regional method we mean two things. In the first place, the whole world is studied by

dividing it into natural regions. Secondly, each continent or country or district is studied under certain heads *e.g.* (*a*) Structure, (*b*) relief, (*c*) climate, (*d*) vegetation, (*e*) mineral, and (*f*) man. Thus, one may study the geography of Lahore or the Punjab or India or Asia or that of the world under these heads. To sum up, if the world as a whole is to be studied it is done by following the natural regions and if any part of the world is to be studied one should follow these heads. It is recommended that when pupils have studied regional geography of two or three countries as, *e.g.* Asia, India, the Punjab, the students may be asked to study the geography of China or Japan or Ceylon independently with the help of a good atlas. In this study pupils may be required to prepare maps showing distribution of population or minerals or climate. This study may also require them to prepare distributional maps and statistical diagrams.

Let us now study the merits and demerits of this method. In the first place, it lends itself to independent study and it can be resorted to individual methods of teaching. Secondly, the method is orderly and systematic. Further,the work done on one continent trains the pupil in the general method by which problems of the other region should be attacked. Above all, it demands a study of human development on the earth and its spread in the world which is the essence of modern geography.

The greatest demerit in this method is that there is too much digression and repetition as the student

is supposeP to follow the same plan again and again. Thus there is no advance in outlook and insight. The scene changes but the method of approach remains the same. It is like putting new wine in an old bottle.

SUMMARY

Methods of teaching geography.—Geography has altogether changed now. It is taught with aims far different from those of a century ago. It is because of some definite purpose in teaching geography, that the following modern methods have come into use :—

(*a*) *Observation method.* The method is based on the principle that seeing by one's eyes produces a more realistic and lasting impression than hearing. This method stresses that geography is taught by direct method based on the experiences gained by one's own observation. Besides nature, there are other objects which can give direct experience to children and they are—museum, demonstration by the teacher, pictures and wall maps and cinema, etc. They offer an invaluable information to children.

(*b*) *Excursion method.* It consists in taking out students in the form of organized groups for study purposes. It differs from the observation method in that the teacher takes them out of school and then he gives them instruction, guides them and directs them as what to observe. In the former case pupils gain experience by themselves. Both are direct methods of teaching but they differ in details.

This method is based on the principle that learning and laughing go hand in hand.

(c) *Laboratory method.* Certain aspects of physical geography lend themselves to best treatment in the form of experiments to be performed by students and the teacher. For instance, Rotation and Revolution, Radiation and Condensation will be best understood if taught by performing certain experiments as in a science subject.

(d) *Project method.*—In a project method some purposeful activity is arrived at. The child, as an individual or in a group, performs those activities which have some meaning with his after school life. Of course, pupils are guided by the teacher but the onus of learning falls on the pupils themselves. Psychologically it is based on the principle of learning by doing. Geography is taught by means of a large variety of projects to be executed by students themselves.

(e) *Regional method.*—It is the most common method of teaching the geography of a district, province or country or continent or of the world. In this method the student has to proceed in a certain order :—(*a*) Structure (*b*) Relief (*c*) Climate (*d*) Vegetation (*e*) Minerals (*f*) Man.

When world is studied it is divided into natural regions and then each natural region is treated under the above said regional sequence.

The method is quite useful in that it lends itself to individual method of learning. Besides, it is orderly and systematic. But the only demerit of this method is that since the student has to

walk on the trodden path there is no advance in his outlook. On the whole the method is very useful and effective.

QUESTIONS

1. Bring out the value of school journeys to supplement school teaching. Suggest a particular journey and mention the points you would emphasize.

2. Explain with examples how the regional method of teaching geography can help the teacher in reducing the burden on the pupils of learning a large mass of useless facts.

3. Narrate briefly the various methods adopted for the teaching of geography in primary and middle classes.

Discuss one of these methods, giving reasons for your choice.

4. What do you understand by the regional method of teaching geography ? In what way is it superior to the old method ?

5. Discuss the various methods of teaching geography in schools. Which of these do you like the most and why ?

CHAPTER XI

PLANS OF A GEOGRAPHY LESSON

In a geography lesson it is recommended that pupils should make an endeavour to take an active part in it. This is possible only if the teacher is careful enough to lead them to make inferences from the facts put forward and to verify facts for themselves with the help of a map, a diagram and statistical data. Then again, home task which forms the application stage of the Herbartian steps, is an important part of an oral lesson and, therefore, should be taken into consideration.

The main duty of the teacher in giving an oral lesson is to act as a stimulant and a guide. Consequently, in order to be successful in his mission the teacher should follow the regional method and the comparative method. He may employ the logical order or the psychological order to suit the subject matter. To add interest to his lesson the teacher may quote examples of recent developments occurring in different parts of the world. It is most desirable that the teacher's knowledge should be most up-to-date by a constant reference to news-papers and magazines.

To add variety to the deductive method of giving a lesson, a vivid description of places and peoples is quite appropriate. These descriptive passages can be got from books on travel, periodicals, articles and illustrated magazines. But a word of caution may be mentioned. The descriptive passage should not be too long. These descriptions become more interesting and living if they are accompanied by pictures and maps projected by an epidiascope. This illustrative material should be well chosen. The teacher must again make a very good use of the black-board with the progress of lesson for drawing diagrams and writing summaries.

The sectional recapitulation is necessary to make the lesson effective. The teacher should not be satisfied with his oral instructions. Pupils are likely to forget or misunderstand what they listen to. Therefore, revision consisting of oral questions and answers becomes essential. The questions should be thought-provoking and to the point. Elliptical questions may be sparsely used. It is suggested also that the new lesson must open with an introduction to the previous one in order to prepare the minds of the pupils for the new lesson. Failure to answer correctly must be investigated. The defect may either be with the teacher or the taught. A wise teacher will at once withdraw the defective questions and put new ones.

Thus a geography oral lesson like a lesson in any other subject may consist of the following Herbartian steps :—

1. **Introduction.**—The general purpose of the first step is to prepare the pupil's mind for the new knowledge. The introductory step will have its purpose fulfilled when it has brought to surface the existing store of ideas, which may form an appropriate point of departure. The general plan is to put one or two relevant questions on the previous topic related to the lesson in hand. Sometimes, when the topic is a new one, a map, or a picture or actual presentation of the object may form a very good introduction. Before entering upon the second step the aim of the lesson should be made clear. In a geographical topic it consists of a line of statement bringing out in clearly the subject of the new lesson. The statement of aim should be as clear as possible.

2. **Presentation.**—In the second step the teacher proceeds to attach the new matter. The whole subject matter to be presented is sub-divided into subsections each one leading logically to the next. Another point worth noting is that each sub-section should have the whole attention centred upon it solely and, afterwards, it should be re-examined with what has gone before. This procedure is called the law of alternate absorption and reflection. For instance, at one time pupils will concentrate upon the plateau of

the Deccan and at an other time they will study it in relation to the rest of India.

3. **Comparison and contrast.**—This forms an essential part in a geography lesson and consists of such comparison and contrast as the pupils are able to do for themselves. Two precautionary measures must be noted. In the first place, the things compared must be thoroughly known. Secondly, only those comparisons should be made which are useful in that they compel the students to think.

4. **Application.**—Knowledge in itself is only a half-way house. Only that knowledge is of educational value, which the pupil can put to some kind of use. Hence the profound importance of this step. When a formula has been deduced, it must be applied to enable the child to understand it well. The application step may have a great variety. It may be applied by making a map or a model or the pupil may apply the geographical ideas in the description of an imaginary journey.

Pupil teachers feel the greatest difficulty in the preparation of notes of lessons on a particular topic. At the end of this book (Appendices A, B, and C) are given three specimens of detailed notes of lessons to illustrate points mentioned above. In the notes of a lesson matter and method should go hand in hand. More stress should be laid on the method of teaching a particular step in the lesson than on the subject matter.

SUMMARY

The plans of a lesson are prepared under four heads :—

(*a*) *Introduction.*—Here the teacher prepares the mind of pupils by putting one or two questions on the relevant portion of the previous lesson.

(*b*) *Presentation.*—The whole subject matter is presented by dividing it into sub-heads. Each step is taught by narration and by putting developing questions. Before proceeding to the next step the previous step must be revised.

(*c*) *Comparison and contrast.*—The whole matter taught is summed up by means of comparison and contrast, in the form of thought provoking questions.

(*d*) *Application.*—The knowledge gained is useless without its application. Therefore some suitable means are employed to apply it.

QUESTIONS

1. Write notes of a lesson on one of the following topics, conforming to the principles of good teaching :

(*a*) The distribution of population in India.

(*b*) The air routes of the British Empire.

2. Draw up an outline scheme for a series of lessons suited to high classes on the economic geography of India. (P. U. 1939)

3. Outline a series of lessons on one of the following :—

(*a*) Irrigation and Agriculture in the Punjab.

(*b*) The hinterlands of Bombay, Karachi and Rangoon—classes IX and X. (P. U. 1940)

4. Draw up notes of lessons for teaching one of the following three topics :—

(*a*) Physical featutes of Italy.

(*b*) Study of the cardinal directions in a primary class.

5. Draw up an outline scheme of a lesson for class VI or VII to show the influence of climatic conditions on the occupation of the people (you may select any geographical region in India for this purpose).

6. Write notes of a lesson for teaching one of the following :—

(*a*) Relief of Asia, IX class.

(*b*) Study of seasons in a primary class.

(*c*) A railway journey from Lahore to Karachi.

(*d*) A visit to the head-works of one of the major canals of the Punjab.

(*e*) Canal systems of the Punjab.

(*f*) Distribution of occupations of the peolpe in different provinces of India.

(*g*) The equatorial region.

CHAPTER XII

GEOGRAPHY ROOM AND APPARATUS

Necessity of having a separate georgaphy room.—Because of financial difficulties it is generally difficult for every school to have a separate geography room, but it is very desirable to have a separate one equipped with suitable geographical materials like maps, models, and other instruments. There are many advantages of having a separate geography room specially designed for that purpose. In the first place, much time and energy are wasted when maps have to be carried by the teacher from room to room. Secondly, the whole material is liable to be damaged and that will involve unnecessary expense of time. Next, the black-board diagrams which accompany a geopraphical lesson cannot be preserved for the same lesson to be given to the next class if there is no separate room. Lastly, geography is a science subject, therefore it requires a geography workshop or laboratory of its own so as to create a congenial atmosphere of the subject which :should stimulate the imagination of and give inspiration to pupils.

Position and size.—A geography room should have the minimum dimensions of 40 x 30 x 18 feet

for a class of 30 pupils. A room with windows and doors on the south side is a necessity and it should open on to school-field or playground to enable the students to observe the natural phenomena like the Sun and weather directly from the room. The room should, therefore, be large enough to enable pupils to walk about. (Fig. 41) (Appendix D).

EQUIPMENT OF THE ROOM

In the first place, care should be taken with regard to the lighting arrangements. If electricity is available the switch boards should be so fixed up as to enable the teacher to light the whole or a part of the room without unnecessary movement. Provision should also be made for lighting the black-board when the rest of the room has to be darkened for showing some slides. In order to darken the room at ease the doors, windows and ventilators should be either fitted with wooden panels or with blinds coloured blue or black. Thus by pulling down the blinds the teacher can darken the room sufficiently for projecting slides.

Storage and Wall display.—All the space of the walls between dado and frieze may be utilized for blackboard, lantern, and picture display. The blackboard should run the whole length of one wall, say, the east wall. Besides, one or two sliding blackboards should be squared, preferably with 2″ square incised rather than painted. The south wall should have two doors and one window to enable sufficient light to come in while the lesson is

going on. Let there be two doors and two windows on the north side of the room.

Cupboard.—On the eastern wall where runs the black-board, let there be a low cupboard $3 \times 3\frac{1}{2} \times 2$ feet below the black-board fixed in the wall where apparatus for projecting pictures and slides are kept. An Epidiascope or a Magic lantern, preferably the former is used for reproducing illustrations from pictures, books, maps, to illustrate some particular point of the lesson. An Epidiascope has an advantage over the magic lantern that it can give the image of a solid object directly without necessitating the construction of a slide as required in the case of a magic lantern. There are various types of a screen which can be used. A screen may be formed by distempering a part of the wall. Another kind of screen is a light rigid wood plank coloured white and is hung from the ceiling by means of a string to be pulled up when not in use. By means of this apparatus it is possible for the teacher to draw the attention of pupils both to the picture displayed and the black-board provided the Epidiascope is placed on the teacher's table and is focussed on the screen fixed on the opposite wall.

Show case.—At the other end of the black-board is fixed either a show-case or a cupboard $1\frac{3}{4}' \times 2' \times \frac{1}{2}$ for specimens of rocks. These rock specimens should be properly labelled. It is necessary that the show case should be glazed and not panelled. In between these cupboards should hang stencils of continents cut out in tin or

cardboard or thick cloth or plywood. With the help of these stencils the teacher can draw the outlines of the continents on the blackboard very conveniently.

Teacher's table.—In front of the black-board should stand the teacher's table which should be sufficiently stout and large enough for display of illustrative material of a geography lesson. If possible one end of the table may have a sink hole. It should also be fitted with drawers and storage space.

Pupil's desks.—The pupils' tables placed opposite to the teacher's table with some space left in between the two, be stout and flat topped containing drawers if possible. Stools or strong chairs may be placed for the students to sit on. Tables may be fixed or movable and are $3\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$ feet. At one corner of the room let there be a tracing table fitted with electric bulbs and its top made of annealed glass. Along the blackboard wall in a corner be placed a vertical map-stand to display wall maps.

Map-cupboards.—The map-cupboards which are placed on the north side are of various types. One most common type is that consisting of an almirah having a single shelf with big round holes grooved in it. In these holes are placed vertically rolled maps. Another form may take the shape of a chest drawer almirah $5\frac{1}{2} \times 3\frac{1}{2} \times 2$ feet in which are placed horizontally rolled maps. Sometimes in an another type of map cupboard hooks are screwed

at the top of the cupboard and maps are then vertically hung by means of rings fixed into the ends of the rolled maps. Such a cupboard occupies very little space and maps are kept quite clean and are easily traceable. Another form of a map-stand in use in most of the schools is one fitted with brackets for the rolled maps to stand on.

Globe.—On the top of these cupboards are placed globes both black-board and physical. The globe may be as large as 19″ in diameter for a class use and as small as 4″ for personal use. The slate globe may or may not have the outlines of continents drawn on them and it is very useful in earlier stages for showing directions, day and night, motions of the earth, etc. A globe is indispensable, because it always conveys the impression that the earth is round.

Maps and their kinds.—The importance of a wall map in giving a geography lesson effectively will be quite evident from the following statement. It was strongly recommended by a noted educationist, Sir HadfordMackenzie, that a map is the tool of the geographer and therefore, no lesson in geography can be called complete without the use of a map. Again, a map summarizes the main points of the lesson and saves labour and time even in the examination. The geography teacher realizes that his lesson without a map is meaningless. Besides, more can be expressed in a single map than by volumes of speech or writings. Lastly, wall maps are important because attention of the whole class can be easily focussed.

There are various categories of maps and they are used according to the mental stage of the pupil.

(*a*) *Picture maps.*—Young pupils can appreciate picture maps. Therefore, in these maps the outline of a continent is drawn and the important features are represented by pictures, *e.g.* mountain ranges by brown lines, desert scenery by a picture of a camel in a yellow background. Thus even such a simple picture does convey some geographical idea.

(*b*) *Physical maps.*—At the next stage brightly coloured physical maps are introduced. In these, low-lands are shown by green colour, uplands by yellow and mountains by brown. In order that the pupil may understand the meaning of the map, the following steps should be followed :—

(*i*) Start be made from the photograph of a well known landmark.

(*ii*) Aerial photo of the same object.

(*iii*) Vertical photo of the same object.

(*iv*) Map of the area.

(*c*) *Local sheets.*—These are drawn on a scale of 1" to a mile and are published by the Survey of India. Exercises based on direction and scale etc. may be set on them. These maps may be had from the office of the Deputy Director. Map Publication, Map Record and Issue Office, Survey of India, 13 Wood Street, Calcutta.

(*d*) *Bath-yorographical Maps* are those which show height and depth by means of symbols and

colours. There is a very large variety of these maps and one of the following series may be purchased for school purposes :—

(*i*) W. A. K. Jhonstan's Bathy orographical series of wall maps (of each continent). Its price is Rs. 75 and can be had from Macmillan and Co., Bombay.

(*ii*) Philip's Comparative wall atlas (world relation) price Rs. 46. Its agents are Longmans, Green and Co., Calcutta.

(*iii*) Complete set of Philip's comparative wall atlas. Each set contains eight maps mounted on linen to enable folding and arranged in the following manner, Physical, Political, Temperature. Rainfall (summer), Rainfall (winter), Natural vegetation, Density of population and Commercial development.

(*e*) *Blackboard maps.*—In order to save the trouble of drawing maps on the blackboard, these are a good substitute. They are publishedb y Longmans, Green and Co., Calcutta. The following series are available : (i) Outline maps of provinces of India (ii) continents of the world (*iii*) countries of Europe.

(*f*) *Atlas maps.*—An atlas map is a great necessity for every child. There are various types of atlases available and one of them may be recommended :—

(*i*) Bartholomew's Indian School Atlas.

(*ii*) Messrs George Gill and Sons' Junior School Atlas.

(*iii*) The Oxford Advanced Atlas. Rs. 7-8-,
(*iv*) Philip's Senior School Atlas.
(*v*) Lyde's Atlas of Economic Geography.

It must be remembered that a map is the only instrument of learning and teaching. Therefore bulk of the geography work should be done with reference to atlas maps. An atlas provides the skeleton of the geography lesson and geography teacher clothes it with the flesh of matter.

(g) *Memory maps.*—There is another type of maps which are drawn by individual students and they are known as *Memory maps.* Their importance lies in that they afford a chance to students to give expression to their factual knowledge.

Now let us again revert to the second cup board in the north wall. This cupboard should be of higher dimensions $5\frac{1}{2}' \times 4\frac{1}{2}' \times 2\frac{1}{2}'$ and is provided with shelves and drawers. These shelves will contain pictures, slides and other apparatus arranged in a systematic manner. These pictures may be gathered from the following sources :—

(*a*) *Magazines.*- Pictorial Educational magazine, Geographical magazine, and National Geographical magazine, (*b*) *Official publications*—Publications of Government Offices, Meteorological and weather reports, (c) News-papers: The Times, Manchester Guardian, Daily Telegraph and the Times Educational Supplement (d) *Advertising agencies*—Shipping, Railway and touring agents (e) *Postage stamps.*

These pictures may be classified under certain heads like the following:—A. Towns ; B. Physical Geography, C. Natural vegetation ; D. Cultivated vegetation ; E. Minerals and Industries ; F. People and Modes of life ; G. Animals.

Great importance is attached to the use of pictures in geography teaching. A simple well selected picture is more effective than a verbal description even if described ten times. The underlying idea of the use of pictures was realized by Commenius who wrote a book namely, "Orbis Pictus" based on this principle. A picture is a formula of the geography teacher. Besides, a picture always appeals to the imagination in which school children are very rich. In order to make the use of pictures successful, the following principles may be borne in mind :—

(1) Always maintain an index and a file of the pictures.

(2) Large pictures may be mounted on a wooden frame or plywood and small pictures may be mounted on butter muslin to avoid wear and tear.

(3) To display small size pictures make use of some projecting apparatus. The teacher should descriminate the use of pictures because they are easy to look at.

(4) The teacher should always describe the pictures and explain to students the things to be seen in them. This is because pupils are not too advanced in this respect.

(5) Each pupil should have a free access to pictures.

(6) After a picture has been shown questions should be set on it to sharpen their memory and enlarge their imagination.

Astronomical Instruments.—The other articles to be placed in the same cupboard are, astronomical and meteorological instruments, a wire globe, a protector, a compass, a blackboard ruler and models. Astronomical instruments are consisting of various types of orreries for teaching the astronomical part of the geography—like the earth as a planet. As far as possible the meteorological instruments including maximum and minimum thermometer, wet and dry bulb thermometer, barometer (Aneriod), windwane and rain-guage, should be easily available to students. The teacher should get prepared weather reports of the local area, with the help of these apparatus. With the help of the ruler the teacher can very easily prepare statistical diagrams to illustrate crop production, exports and imports.

Library.—Against the wall lying between the two doors on the south should be placed two big almirahs for Geography books. This will serve the purpose of a geographical library. These almirahs should not merely be packed with text books of geography but the stock should include books on travel and other illustrated and descriptive books. Picture-books are a necessary addition on account of their great appeal to young pupils.

Text-books and *Reference books.*—A geography library should also contain some advance books for intelligent students and for the use of the teacher. The Statesman's Year Book and Whitaker's Almanac are useful additions to the library. Although, these reference books are a great necessity, yet the importance of a text-book should not be overlooked by the teacher. It is because a text-book is a tool both in the hands of the teacher and the taught. Again, a text-book gives continuity and cohesion to the teaching process. A well chosen text-book forms a useful basis in the new lesson and affords material for hometask. Even pictures contained in a text-book permit putting questions on them. It should be clearly understood that a text-book gets out of date, therefore, the teacher has to take special pains to keep his knowledge up-to-date. Following are some of the books recommended for the Geography Library :—

1. Peeps at Many Lands series, published by A.C. Black, Ltd, London.
2. Black's Colour series.
3. Black's pictures of many Lands.
4. Things Seen series, published by Seeley Service and Co.
5. A set of Herbertson's Descriptive Geography published by A. C. Black.
6. A good advanced text-book on general geography.
   (*a*) A General and Regional Geography by Taylor and Unstead.

(*b*) Asia by Lyde.
(*c*) Europe by Lyde or by Shanahan.
(*d*) N. America by Lane.
(*e*) S. America by Shanahan.
(*f*) Africa by suggate.
(*g*) Australia by Fitzgerald.

7. A standard book on Economic Geography.
(*a*) A Handbook of Commercial Geography by Chisholm.
(*b*) Intermediate Commercial Geography by Dudley Stamp.
(*c*) Commercial Geography by Curr.

8. An authoritative book on Physical Geography.
(*a*) Physical Geography by P. Lake.
(*b*) Physical basis of Geography by Woolridge.
(*c*) Physical Geography by Gregory.
(*d*) Physical Geography for Indian students by Fox.

9. A standard book on Human Geography.
(*a*) Semple—Influence of Geographic environment.
(*b*) Fluer—Human geography.
(*c*) The Geographical Background of Modern Problems (Longmans).
(*d*) Lyde—Man in many lands.

10. Other books.
(*a*) Climate by Kendrew.
(*b*) Plant Geography by Hardy.

11. An advance atlas.

12. Statesman's Year Book.

13. Some Magazines—
(*a*) National Geographical Magazine.
(*b*) Times of India Illustrated Weekly.
14. India by Morrison.
15. The Punjab and N.W.F.P. by Dewey.

Picture railing.—Lastly a picture railing be fixed all round the room well above the doors except for the space used as a screen. This railing should be fitted with hooks for pictures showing life in different parts of the world, *e.g.*, pictures of Egyptian desert, Niagara falls, Suez canal, Panama canal, Amazon basin, Congo basin and Tundra region etc. Below the railing are hung framed pictures drawn and collected by pupils themselves.

SUMMARY

Geography being a practical subject should have a separate room of its own to store articles used in its teaching, otherwise there is great wastage of time, labour and money. The room should be well equipped with cupboards almirahs and shelves as well as with other essentials, *e. g.* black-board, picture-railing, map stands and geography apparatus. A diagram of the geography room is given in Appendix D. The geography room should be equipped with the following geographical apparatus which may also be considered as aids to teaching of geography :—

AIDS TO TEACHING OF GEOGRAPHY

1. *Black-board.*—There are different varieties. It should be large enough.

2. *Globe*—physical and relief. A globe should have a diameter of 12 inches.

3. *Maps*—a wall map, a complete series of the world and of the individual continents. Each student should have a good atlas of his own.

4. *Pictures*—large and small, mounted or unmounted.

5. *Reference Library*—It should contain text books, advance books, reference and general books, as well as, magazines.

6. *Magic lantern and Epidiascope or cinematograph*—to throw pictures on the screen.

7. *Radio*—to listen to radio programmes on geographical topics.

8. *Models*—prepared and purchased by pupils.

9. *Meteorological apparatus*—Thermometers, (Maximum and Minimum, Centigrade, Fahrenheit and Reaumer) Rainguage and Barometer.

10 *Geography museum.*

11. *Official pamphlets and reports.*

The above mentioned articles may also be considered as aids to teaching as well as necessary equipment of the geography room.

QUESTIONS

1. What should be the special features of a geography room ? Which of these would you leave out if you had only a moderate sum of money at your disposal ? (P. U. 1938)

2. What place in Geography teaching would you give to (a) maps (b) text books (c) practical

work at different stages ? (P. U. 1939)

3. Critically consider the value of different visual aids in the teaching of geography in the middle and high classes.

4. How will you fit up the geography room in your school? What use will you make of the various kinds of material that forms part of your geographical collection ? (P. U. 1940)

5. A donor wishes to help you in equipping your geography room (only 30′ × 22′) with books. maps, apparatus, furniture, magazines etc. upto a limit of Rs. 500. Draw up a list of your requirements. Ordinary furniture of the room is already provided. (Aligarh University)

6. Discuss text books and their place in geography with special reference to those used in your province in the primary and middle classes.

7. What are the chief dangers which a geography teacher must avoid in the use of (a) maps, (b) models.

8. (a) One of the real disadvantages of a text book in geography is that it soon gets out of date. What efforts will you make to keep yourself up-to-date ?.

(b) Make a list of twenty books which you think a geography reference library should contain.

9. "Pictures and maps in geography are not mere illustrations but they are fundamentals also". Discuss the statement.

CHAPTER XIII

GEOGRAPHY MUSEUM

Importance of a geography museum.—A geography museum is a part of a geography room in a school. In most of the Anglo-Vernacular schools in India this museum has been considered as an annexe to the geography room. A geography museum serves many useful purposes. In the first place, museum is a great educational institution in itself rather than a repository of interesting objects. Secondly, a geography museum is of tremendous value in bringing home to every child the close connection between class lessons and daily life. Again, collecting things for a museum offers quite an interesting amusement and healthy recreation and also places the child in direct contact with nature. Finally, it is a very good means of sublimating the collecting instinct of children who have a natural bent of mind at this stage. When the child has observed things in a museum with his own eyes he becomes still more interested to gather further information on the same topic. A great majority of school children as well as grown ups show a lack of observation and knowledge of most

common things. It is because sufficient practice has not been given to them in schools. The greatest beneficial point in favour of having a geography museum of its own is that the objects having been prepared and contributed by the pupils will be a constant source of pride to themselves and a fillip to his class-fellows.

Equipment of a geography museum.—There is a very large variety of objects which may be included in the geography museum. The following are the most important :—

1. Pictures and picture post-cards, illustrating the life of the people in various parts of the world.

2. Models of clay or plasticine, either made by children or purchased from the market, exhibiting life in other lands or illustrating some geographical terms or phenomena.

3. Locally manufactured articles such as, cloth, pottery, wood and metal works, basket work, lacquer work and painting.

4. Specimens of Agricultural crops, *e.g.* rice, millet, wheat, peas, oil-seeds and fibres.

5. Different kinds of rocks, stones and minerals. It is desirable that each specimen be labelled and some account of the areas of availability should be written.

6. Foreign stamps, coins and pamphlets.

In general, selection should be made of those objects which have a meaning to the lives of the pupil. The best occasion for collecting objects is when the pupils have gone out on some excursion.

It is a better plan if the whole work is divided on the basis of division of labour. Let one pupil confine oneself to the specimen of one type of rock, another to another type. The third pupil should collect pictures on physical geography and the fourth may collect one type of timber and so on and so forth. Let the specimens collected illustrate some particular point or stage of the manufactured articles, *e.g.*, steel, cotton or wool. The teacher should aim at having complete sets of articles. Lastly, the geography museum should be of easy access to every pupil in the class. Consequently the show cases in which these articles are placed should be fixed up at convenient places. So, it will be necessary that these show cases be 6 feet long, 4 feet high and 3 feet broad and fitted with glass tops and sides. They should be all locked for the sake of safety.

A geography museum will be a great success if certain principles are kept in view. A geography museum is not the primary concern of the geography teacher but, instead, every boy or girl must take some part in it by feeling a personal interest in its maintenance and upkeep. A museum is likely to flourish if management rests with a museum committee of students working under the guidance of a kind and sympathetic teacher. In this way, every boy or girl will feel a natural pride in one's exhibits marked by the word "presented by". It is natural that the museum gets dusty and the contents

damaged and become out of date. To avoid this discrepancy the museum should be cleaned periodically and every damaged article suitably replaced.

Once a museum has been set up it becomes a permanent feature and becomes inexpensive henceforth, because it does not need much replacement. Above all, it becomes a constant source of employment of interest and instruction to those whom it intends to benefit.

SUMMARY

A geography museum is the most essential link of the geography room. It serves many purposes :—

(*a*) It is an educational institution in itself.

(*b*) It connects class-room teaching with the daily activities of the pupil.

(*c*) It affords a very good hobby in collecting articles for the museum.

(*d*) It sublimates the baser instincts of pupils.

(*e*) It is a good stimulus for a dullard.

A geography museum may be equipped with the following articles :—

1. Pictures 2. Models 3. Manufactured articles 4. Agricultural crops 5. Specimens of rocks 6. Foreign stamps and coins.

In order to be successful in its object the following principles should be borne in mind :—

1. Have a committee to manage it.

2. Everybody must contribute something to the museum.

3. Museum should be accessible to everybody.

4. Every article contributed should be properly labelled and duly replaced.

QUESTIONS

1. Show the necessity of a geography museum.

2. How would you set about making a geography museum ?

3. What is the educational value of a geography museum in a school ?

4. Suppose you are put in charge of a museum. How would you run it successfuly ?

5. "A geography museum is a great asset to a school". Discuss.

CHAPTER XIV

HANDWORK IN GEOGRAPHY

Importance of Handwork.—In modern times handwork in one form or the other is becoming a popular subject because of its great use in educating the child. It is now agreed upon that manual skill acts and reacts very favourably on the intellectual faculties of the human being and is a sure aid to his development.

Before explaining the correlation of handwork and geography, it is desirable to describe the inherent advantages of correlating the two. They can be very conveniently acquired if certain principles are kept in mind by the pupils.

The main purpose of including handwork in geography is to train the eye to accuracy and rapidity in observation. In the second place, this correlation will render the hand a very useful servant of the brain. Thirdly, it will develop the latent powers of the mind. It will also inculcate habits of truthfulness, honesty, neatness, orderly arrangement and accuracy in observation and measurement. These habits will be of great use

in after school life of the child. Thus, in a way, this correlation is providing a training for true citizenship.

Place of handwork in geography.—Now let us direct our attention to know the exact place of handwork in geography. These two subjects are very closely related to each other. Each subject extends a helping hand to the other. Sometimes geography may serve the purpose of handwork and at other times handwork may function for geography. The project method is the most direct method of approach to the correlation of geography and handwork.

In a broad manner geography and handwork are correlated in two ways, (*a*) a topic of geography may prepare the ground for some manual work, (*b*) a manual worker while carrying on some manual activity may get geographical information. Before dealing with the principles applying to any piece of geographical handwork, it is good to illustrate the position of handwork in geography with some examples.

Types of handwork.—Now handwork may assume any one or all of its forms. It may include hand and eye training and manual training. Hand and eye training means such occupations as paper, clay and cardboard modelling. Similarly, by manual training is meant courses in wood, metal and clay such as, school gardening, book binding, pottery and enamel work.

Clay modelling is the cheapest and the easiest form of manual training in handwork and is therefore generally the first to be employed in the education of the child. It can very easily illustrate geographyical topics. The child can quickly understand such terms as, an island, an isthmus, and a cape if concrete models of clay are presented. It is also a good exercise if children, too, prepare models of clay exhibiting some geographical phenomena. Similarly, children may prepare models of clay showing the rotation and revolution of the earth, distance of the earth from the sun and phases of the moon. Let one of the clay balls be painted yellow to represent the sun, a white to show the the moon and a brown the earth. Again, pupils may prepare topographical models to show the knowledge they have acquired of a place or life in any region of the world. For instance, a project may be set on preparing models showing the desert scenery. It will consist in spraying sand in a wooden tray, and making models of a camel, a desert-man made of clay, a spring and a tent, show an oasis in a desert.

In a similar manner paper cutting and folding may be associated with some geography lesson. For instance, children may prepare balls by folding and refolding paper of a squared length. If inside half is painted black and the second half white it will serve as both a good game and a good apparatus

to explain the phenomenon of day and night. Another piece of work connected with the paper folding is the repairing of maps by the students. Handwork may also serve geography by supplying apparatus for the geography room and for field work. Wood and metal work may be associated with freehand sketching of maps, and making stencils of different continents and countries. There are many simple instruments to be employed for illustrating geographical topics. These can be conveniently prepared by students in a manual workshop. Some of these instruments are picture frames, map stands, thermometer stands, pointers, and plane table.

Geography and handwork.—Now, let us see how geography serves the handwork. There can be many geographical studies arising out of handwork. When wood is used as a material for handwork, an earnest manual worker will have to study the different varieties of timber ; the place of their growth ; the climatic conditions under which they grow ; and if possible, ports of shipment. It is nothing but merely a geographical knowledge. Similarly a school garden offers excellent opportunities for a geography lesson on forests and agricultural crops and their cultivation.

Material for handwork.—There is a great variety of material which can be employed for geographical handwork. For the younger children up to the age of 12 years paper, clay, card

board and light wood work are recommended. On the other hand, senior pupils may take up work in wood and metal.

Important Principles.—Following are some of the principles to be borne in mind in geographical handwork.—

1. The material used should be within the comprehension of the pupil's intellectual powers.

2. The material should be harmless and sanitary.

3. The material should develop a taste for handwork.

4. Pupils should not be reluctant to buy the necessary material because of high price.

5. Pupils should have a thorough study before they actually start doing handwork.

6. As far as possible, it should be pupil's own creation and therefore should not be over directed.

7. If a substitute of the material has to be employed, it should be similar to the original in make and texture.

SUMMARY

Handwork is becoming popular among subjects of school curriculum because of its inherent advantages. The greatest function of handwork is to develop the five senses of the child.

There is a great variety of handwork, like metal and wood work, lacquer work, painting, clay modelling, etc. Many of the geographical apparatus can be prepared by students themselves.

The material required for handwork should not be very expensive or complicated. Besides, it should lend itself to neatness.

Both handwork and geography are very closely correlated in that they serve eath other.

QUESTIONS

1. How will you correlate geography with handwork ?

2. Discuss the importance of handwork in geography.

PART II

CHAPTER XV

CLIMATE AND INSTRUMENTS USED IN ITS STUDY

Climate and weather.—Weather is a condition of either temperature or rainfall or humidity or wind or sunshine or cloudiness or of all at a certain time. When we say that it is very hot or that the day is cloudy, we talk of weather conditions. On the other hand the average weather conditions of a certain place for a certain period of time constitute its climate. Thus if we want to know the climate of a place, we must take into consideration its temperature not for a day but for a long period, say, a year. We shall note the direction and force of winds and also measure the amount of rainfall that has taken place in a year. Thus we measure the temperature, pressure and rainfall of the year and get their average which constitutes its climate. So to say, weather is the condition of the atmosphere at a particular time, while climate is the average of weather conditions for a number of days, say, a year.

Factors of climate.—From the above comparison we have seen that weather or climate consists of

three elements, *i.e.*, temperature, pressure and rainfall. We shall now study their governing factors in detail and the instruments that are used to measure each.

Temperature.—We are all familiar with the sensation of heat and cold. We can say by touching an object with our hands whether it is hot or cold, but we cannot say how hot a substance is at a given time. Thus the quantity or degree of heat cannot be measured by our sense of touch. *This degree of hotness is called temperature.* A hot body is said to be at a high temperature and a cold body at a low temperature. When a man is suffering from fever we generally say that he has got a temperature. The temperature varies from place to place depending upon the following factors :—

(*a*) **Latitude.**—On an average, temperature decreases from the equator to the poles of the earth's surface. It is because as we go nearer the poles the rays of the sun fall more slantingly on the surface of the earth. We all know that vertical rays are hotter than the slanting rays because, in the first place, vertical rays have to heat lesser area and secondly, they have to pass through a lesser distance in space. Consequently there is greater heat at the equator where rays fall vertically than at the poles where they fall slantingly.

(*b*) **Altitude or height.**—Temperature falls with height roughly at the rate of 1°F for every 300 feet of ascent. For instance, a mountain 300 feet high would be 10°F colder at the top than at the

bottom. Therefore, mountains are cooler than plains. Thus Simla is cooler than Lahore.

(*c*) **Distance from the sea.**—Water takes a longer time to be heated and cooled than land. Therefore, during the day when the sun shines on land and sea, the former gets heated sooner than the sea and therefore a wind will blow from sea towards land known as sea breeze. Similarly land breeze will blow from land to sea at night because the land is colder than the sea at night. These winds lower the temperature of a place towards which they blow. Thus Karachi is cooler in summer and warmer in winter than Multan.

(*d*) **Prevailing winds.**—The prevailing winds modify the temperature conditions according to the nature of the area from which they blow. A wind from sea lowers the summer and raises the winter temperature. Similarly a wind from the land lowers the winter temperature and raises the summer temperature. Thus Bombay is cooler than Delhi in summer and warmer in winter.

(*e*) **Ocean currents.**—Currents of the ocean modiiy the temperature of a place near which they pass. Warm currents raise the temperature and cold currents ; lower the temperature. Labrador and Norway are situated in the same latitude, but the former is colder on account of the cold Labrador current ; the latter is warmer on account of the warm Gulf Stream.

(*f*) **Clouds and rainfall.**—Heavy rainfall and dense clouds lower the temperature as in Bombay,

while in a desert area temperature is very high because of free radiation.

(g) **Nature of the soil.**—Sandy soil is heated and cooled sooner than clayey or loamy soil. That is why Rajputana is hotter than Bengal in summer.

(*h*) **Slope of the land.**—In the N. hemisphere southern slopes are warmer than northern ones because the southern slopes are sheltered from icy cold winds of the Arctic region and also because rays of the sun falling on the southern slopes are more vertical than those on the northern slopes.

All these factors combine to bring about a variation in temperature at different places. Besides, the temperature varies during the day. This mperature is measured by means of an instrument alled Thermometer.

Thermometer.—Generally a thermometer consists of a long and narrow stem or glass tube and a small bulb. The bulb either contains mercury or alcohol coloured red. The stem or the frame which supports it is always graduated. These marks and figures on the stem are known as a scale.

Three scales of a thermometer.—Place an ungraduated thermometer in a beaker of ice and water. The mercury level will stand at its lowest level known as the freezing point. Now place the same thermometer in the steam from boiling water. The mercury level will rise from the bulb into the stem and will stop after reaching the highest point. This is called the boiling point. When these fixed points are marked on the thermometer, then the

space in between the two fixed points is divided into equal number of parts.

If the lowest point is marked 0° and the upper fixed point as 100° and the space is divided into 100 equal parts. Such a thermometer is known as a Centigrade Thermometer. If the space is divided into 80 equal parts and the lower point marked as 0° and the upper as 80° we get the Reaumer Thermometer. If, on the other hand, the space is divided into 180 equal parts and the lower fixed point is marked 32° and the upper 212° we get the Fahrenheit Thermometer.(Fig.1).

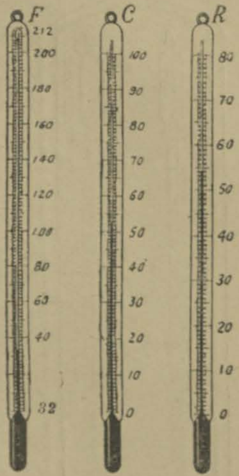


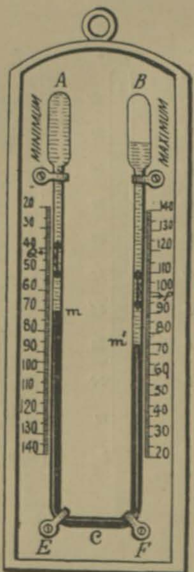
Fig. 1.
Three kinds of Thermometers.

Thus temperature may be measured with the help of a Centigrade or a Fahrenheit or a Reaumer thermometer and will then be written as C°, F° or R° respectively as the case may be. In India Centigrade and Fahrenheit thermometers are used and in Germany the Reaumer.

KINDS OF THERMOMETERS

Maximum and minimum thermometers.—Suppose we wish to know the highest and the lowest temperatures for the day. It would be very trouble-

some to watch the thermometer every hour in order to note the highest or the lowest temperature reached during he day. Even if this practice is followed it will not be accurate. Thus there exists a thermometer known as Six's Self-Registering Maximum and Minimum thermometer. This will record automatically the highest and the lowest temperatures of a given period of time.


Fig. 2.
Max. & Min.
Thermometer.

It consists of a U shaped tube ontaining mercury. The bulb A and part of the stem upto m is filled with alcohol. The bulb B and part of the stem up to the mark of m′ contains alcohol. Part of the bulb B is left unfilled to give space for expansion. (Fig. 2).

When the temperature rises, the alcohol in A expands, the end m of the mercury column falls, and end m′ rises and pushes the index P ahead. When the temperature falls, the alcohol in the bulb A contracts, the end m′ of the mercury falls and the end m rises and pushes forward the index Q.

Thus the position of the lower edge of the index P indicates the highest temperature and that of Q the lowest temperature reached during a given time. The indices are provided with steel springs,

which do not allow them to move up and down by themselves. In order to set the thermometer, the indices are pushed down to the level of the mercury column by a magnet.

Maximum and minimum temperature.—The highest temperature reached during the day is called the maximum temperature and the lowest temperature reached during the day is called the minimum temperature.

Mean temperature.—The mean temperature of a day is obtained by adding together all the temperature readings made during the day and dividing the sum by the number of times the observations are made. To be more economical the average of the maximum and minimum temperature for a day is very nearly the mean temperature of a day.

Mean annual temperature.—If we add all the mean temperatures for each day of the month and then divide the sum by the number of days in a month, the result is the average temperature of the month. If we divide by 12 the sum of mean temperatures of 12 months we get the average temperature for the year. If we add the average temperatures of 5 years and divide the sum by 5 we get mean annual temperature.

Daily range of temperature.—The difference between the mean temperature of the day and the night is called the daily or diurnal range of temperature.

Annual range of temperature.—The difference between the mean temperature of the hottest and

the coldest months of the year is known as the annual range of temperature. A small annual range indicates the equable or maritime climate as that of Japan or Great Britain. Where this range is great, the climate is said to be one of extremes or continental, e.g. Tropical countries like, India.

Temperature curve.—The variation in temperature for a given period is expressed by means of a curve drawn on a graph paper. In this way one need not look into the figures and will come to know at a glance the rise and fall of temperature.

Isotherm.—There are certain places on the earth's surface having the same temperature. A line joining these places of equal temperature is called an isothermal line or an isotherm, *i.e.*, a line joining places having equal temperatures (iso-equal; therms-heat).

SUMMARY

Climate is the average of weather conditions, while weather is the condition of temperature, pressure and rainfall at a given time. Weather consists of three elements.—temperature, pressure and rainfall.

Temperature. Is the degree of hotness and coldness.

FACTORS ON WHICH THE TEMPERATURE OF A PLACE DEPENDS.

1. **Latitude.** Temperature decreases from the equator to the poles.

2. **Altitude.** Temperature decreases at the rate of 1° F for every 300 feet of ascent.

3. **Distance from the sea.**—Places situated near the sea have a lower temperature than those which are far away from it.

4. **Prevailing winds.**—Winds coming from the sea lower the temperature while those coming from hot land raise it.

5. **Ocean currents.**—Warm and cold currents raise or lower respectively the temperature of the places near which they flow.

6. **Rainfall.**—A rainy region has a lower temperature than a dry area.

7. **Nature of the soil.**—Sandy soil is heated and cooled sooner than clayey or loamy soil.

8. **Slope of the land.**—Southern slopes are warmer than the northern slopes in the N. hemisphere and *vice versa.*

Temperature may be measured by one of the three thermometers, Centigrade, Fahrenheit and Reaumer. Centigrade thermometer has its range from 0°—100° C, Fahrenheit from 32°—212°F and Reaumer from 0°—80°R.

The highest and lowest temperatures are measured by the maximum and minimum thermometer. The mean temperature of a day is the average of the temperature of a day. The mean annual temperature is average of the temperatures of a number of years. The range of temperature is the difference between the two temperatures.

The variation in temperature is expressed in the form of a curve line drawn on a graph. Isotherms are lines joining places of equal temperature.

QUESTIONS

1. Define maximum temperature and minimum temperature. How is the mean daily temperature found ?

2. Following table gives the maximum and minimum temperatures. Find out their mean and draw a curve showing the result.

Date	Maximum	Minimum
1.	52°F	48°F.
2.	51°F	48°F.
3.	51°F	48°F.
4.	51°F	47°F.
5.	50°F	40°F.
6.	49°F	39°F.

3. (*a*) Define an isotherm.

(*b*) What are the differences between a typical oceanic climate and a typical continental climate ?

4. Draw the diagram of the various types of thermometers that are used in schools. Describe the working of the Maximum and Minimum thermometer (P. U. 1945).

5. Name the factors on which the climate of a place depends.

6. Differentiate between climate and weather and discuss the value of each for human activity.

(P. U. 1944.)

CHAPTER XVI

PRESSURE AND WINDS

Pressure of the atmosphere.—Air has its weight. To prove it, take a football bladder and weigh it. Fill it with air and reweigh it. The difference in the two weights will give you the weight of the air contained in it. This air which has got weight of its own is easily compressed and expands when the pressure on it is decreased. The earth is surrounded by a stratum of air many miles high. The air becomes less dense as we ascend. This air because of its weight presses on the surface of the earth and on the objects present on it. The pressure varies from place to place. The pressure at sea level on the average is 15 pounds to every square inch but this pressure decreases at the rate of 1″ after 900 feet of ascent. On an average one cubic foot weighs $1\frac{1}{4}$ ounces.

Factors on which the pressure depends.—The variation in pressure depends upon the following factors :—

(*a*) **Temperature.**—Air when heated expands so that one cubic foot of air at the lower temperature will weigh more than one cubic foot of air at the higher temperature. On the other hand, when air is cooled, it contracts and occupies lesser space and can accommodate more air and its weight thus increases. As we have seen before temperature changes from hour to hour. Therefore

pressure also varies from hour to hour at the same place and from place to place at the same hour.

(*b*) **Moisture.**—Moisture is lighter than dry air, therefore clouds float in the air like a piece of wood in water. If there is much moisture in the air, the pressure decreases and winds will begin to blow and rain falls. It is because one cubic foot of dry air weighs more than a cubic foot of moist air both being weighed at the same temperature.

(*c*) **Altitude.**—Pressure of air decreases with altitude, because air becomes less dense at the top. Pressure decreases at the rate of 1″ after every 900 feet of ascent, while temperature decreases by 1°F after every 300 feet of ascent. At sea level there is the greatest pressure.

Measurement of atmospheric pressure.—We measure the pressure of air by an instrument known as, Barometer (*baro* means pressure and *meter* is one which measures). The simplest form of a barometer consists of a graduated glass tube 36″ long closed at one end and open at the other. It is filled completely with mercury and is then inverted in a cup containing mercury. When the tube is held in a vertical position some of the mercury flows down into the cup and will stand at a height of 30″ (Fig. 3). However

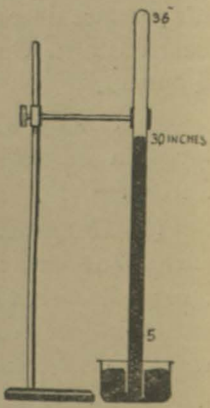


Fig. 3.
Tube Barometer.

the size, shape, height or form of the tube may change, the height of the mercury column is always the same in the tube, *i.e.*, 30 inches or 76 cms.

By the term 30″ pressure of air we mean the weight of the mercury which stands at a height of 30 inches in a tube of 1 square inch in cross-section. Thus the pressure of the atmosphere is equal to the weight of the mercury column 1 square inch in cross-section and 30 inches in height. The pressure may also be measured in centimetres. The unit of weather maps is the bar which is divided into one thousand milibars. One bar is equal to a barometer reading of 29·53 inches. The barometer (at sea level) rarely falls below 28 inches (950 milibars) and rises above 31 inches (1050 milibars).

Aneroid Barometer.—Such a barometer as described above is not portable and therefore, cannot be carried to different places. There are many other kinds of barometers, *e.g.* Siphon barometer or Fortin's barometer and Aneroid barometer. Of all these Aneroid barometer is the best. It is very convenient, accurate and portable. In its construction it consists of a metallic box with a flexible lid. The box is partialy exhausted of its air so that the lid may buldge in or out with the increase or decrease of external



Fig. 4.
Aneroid Barometer.

pressure. The box is connected with a spring which in turn is attached to the base of the barometer plate. A thin rod is attached with the spring and any movement of the lid is transmitted through the spring to the rod, which moves on the plate and thus enables one to read it. (Fig. 4).

Barograph.—The meteorologist records these variations in pressure by an instrument known as barogragh, based on the principle of aneroid barometer. This instrument records automatically the changes in pressure.

Pressure curve.—The readings from the barograph are expressed in the form of curves drawn on a graph paper as in the case of temperature curves.

Isobars.—Isobars are lines which join places of equal pressure (iso-equal and bar means pressure). The meteorologist from these readings forecasts weather based on the following principles :—

1. A rising barometer (high pressure) indicates fair weather.

2. Rapidly falling barometer indicates an approach of rain or storm.

3. Continued high barometer indicates fair weather.

Pressure belts.—When we look at the world as a whole we find there are certain well marked high and low pressure belts.

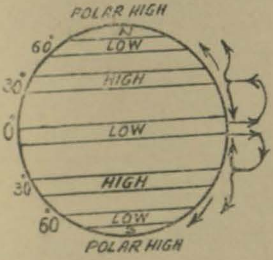


Fig. 5.
World Distribution of Pressure.

1. *Equatorial low pressure belt.*—It is due to the great heat because of the sun's rays falling vertically throughout the year. The heated air rises as convection currents and then descends in the region of tropics.

2. *Polar low pressure areas* are low due to the rotation of the earth. The air near the poles is swung round down to tropics due to the rotation of the earth, but at the poles there are high pressure centres because of extreme cold.

3. *High pressure belts*—These belts get air from two sources one from the poles and the other from the equator. Thus it is reasonable to expect high pressure areas near tropics.

Wind and its kinds.—The chief importance of pressure lies in its control of winds. Wind is simply air in motion. This horizontal movement brings about an equilibrium in the distribution of pressure. Winds as a rule blow from a high pressure area to a low pressure area just as water flows from a higher level to a lower level. Now let us see how pressure belts of the world control the wind system. There are four kinds of winds : (*a*) Permanent or

planetary winds (*b*) Periodic or seasonal winds (*c*) Aperiodic or variable winds and (*d*) Local winds.

(*a*) **Permanent winds.**—There are two examples of this type of winds :—

(1) Trade winds that blow from 30° N and S (sub-tropical high pressure areas) to the equatorial low pressure areas.

(2) The Anti-trade winds or Westerlies that blow from 30° N and S towards the temperate low pressure belt 60° N and S (Fig. 6). Their paths are permanent, but they change a little in the direction due to the rotation of the earth. According to Ferral's law, " winds blowing in the northern hemisphere turn towards their right and those blowing in the southern hemisphere turn towards their left ". The trades, therefore, become north-east in the northern hemisphere and south-east in the southern hemisphere. The anti-trades become south-west in the northern hemisphere and north-west in the southern hemisphere and are then called westerlies. Trades have deserts situated towards their west and westerlies towards their east.

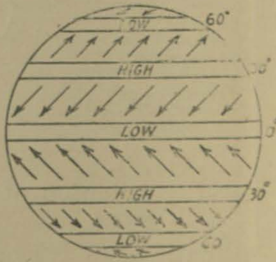


Fig. 6.
Trade and Westerly winds.

(*b*) **Seasonal winds.**—Under these we include two types, (1) Monsoons and (2) Land and Sea breezes. The monsoons are caused due to (*a*) the

shifting of the wind belts and (*b*) unequal heating of land and sea masses. On account of the earth's rotation and revolution and inclination of the earth's axis the region of the greatest heat (Thermal Equator) approaches the 12° N and 8° S latitudes during the northern and southern summer respectively instead of being at tropics. Therefore, pressure belts move with the movement of the thermal equator and consequently 12° N and 8° S form the areas of lowest pressure in the northern and southern hemispheres in their respective summers. With this movement of pressure belts winds

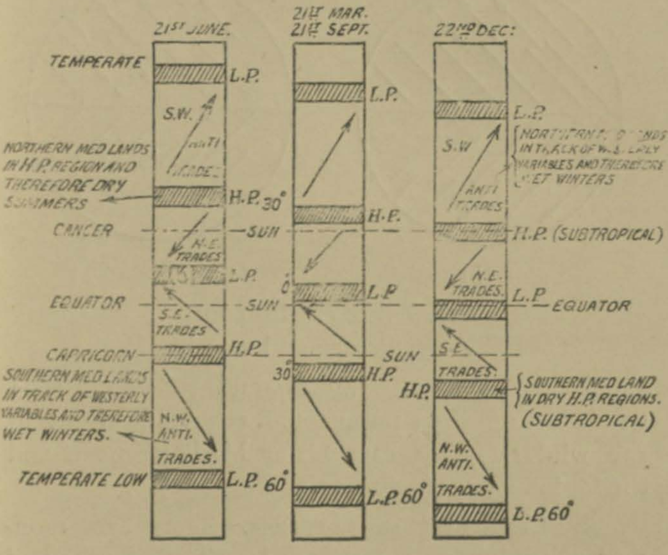
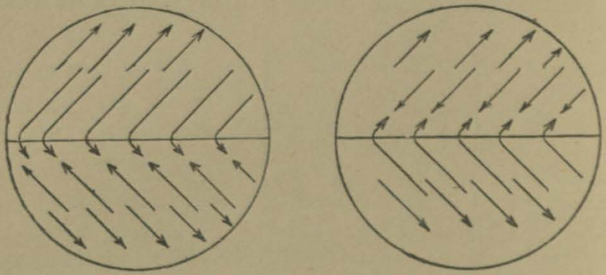


Fig. 7a. (After Thoma)
Shifting of wind system.

also migrate accordingly. On account of this swing of pressure-belts two prominent changes take place.

(*a*) When the lowest pressure area is either at 12° N or at 8° S the respective trade winds have to cross the equator in order to reach it. When the equator is crossed deflection takes place and N. E. trades appear to be coming from N. W. and S. E.. trades from S. W. directions. These seasonal winds which are only caused in respective summers are known as Monsoons (Figs. 7 *a*, *b* and *c*.)



(*b*) (*c*)

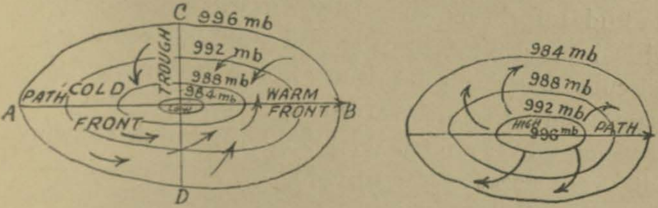
Fig. 7 b & c. Monsoons
After Preece and wood.

(*b*) Between 30°—40° N and 30°—40° trade winds blow in the summer and anti-trade winds in the winter. This causes the Mediterranean and the China types of climate.

2. **Land and sea breezes.**—They are monsoon winds but on a small scale. They are caused due to unequal heating of land and sea masses. When wind blows from the sea towards the land

it is called a sea breeze and a wind blowing from land to sea is called the land breeze.

(c) **Variable winds.**—Cyclones and Anti-cyclones are included under these heads. A cyclone is an area of low pressure surrounded by a high pressure area. While anticyclones are high pressure areas surrounded by low pressure areas. Diagramatically they are shown in the form of concentric ellipses. They vary in size from 50 sq. miles to 1000 sq. miles in area. They generally move from west to east direction helped by westerlies. (Figs. 8 *a* and *b*). Their speed varies from 20 to 30 miles an hour.



(*a*) (*b*)

Fig. 8 a & b.

Cyclones and outicyclones.

The cyclone is divided into two parts, warm front and cold front. In a cyclone, winds blow in an anti-clockwise direction. The coming of a cyclone is indicated by the fall in barometer. This warm southern wind in the warm front rises and gives heavy rainfall in the centre. The rear of cyclone is known as cold front and here the winds are North and North westerly and they are descending. Thus when the trough of the cyclone has passed away from the place, barometer rises and

wind system changes. Thus a cyclone brings heavy rainfall in the centre.

In an anticyclone winds are light blowing outwards in a clockwise direction. The winds are descending in nature, therefore they tend to pick up moisture rather than shed it and consequently the anticyclonic weather is dry and bright.

The origin of a cyclone is based on the Polar Front theory. This is explained by saying that cold polar air descends and equatorial hot air rises and they meet together in the warm temperate latitudes forming the polar front. This up and down movement of hot and cold air produces a circular motion to be known as a cyclone. After some time the polar front is occluded and the cyclone moves ahead. (Figs. 9 *a*, *b*, *c*, and *d*, showing different stages of the formation of a cyclone).

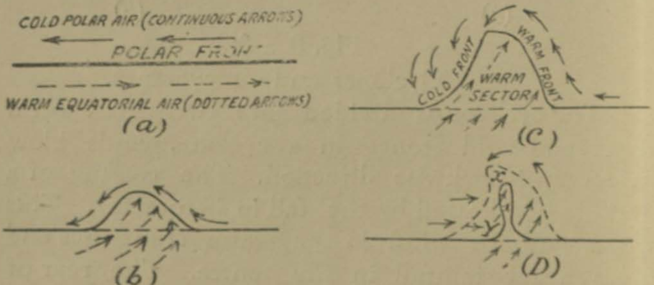


Fig. 9 a, b, c, & d. (After Bygott)

Showing different stages of the formation of a cyclone.

An Anticyclone is formed by the union of two cyclones. The high pressures of two cyclones combine to form the central high of the anticyclone and which in turn gets surrounded by low pressure.

(*d*) **Local winds.**—These are winds which blow in particular localities and therefore they have different names at different places. They have a considerable effect on the climate of the locality through which they blow. They are :—

(*a*) **Fohn winds.**—They are warm and dry winds of the Alps. They raise the temperature of the region through which they blow.

(*b*) **Chinook winds.**—They descend from the ockies to the eastern plains of U.S.A. They are also warm dry winds. They char the grass and thus turn it into hay.

(*c*) **Sirocco winds.**—They are hot winds blowing from the Sahara to the Mediterranean sea.

(*d*) **Bora and Mistral Winds.**—They are cold winter winds blowing from poles. They lower the temperature considerably.

SUMMARY

Air surrounds the earth. Therefore, air exerts pressure on everybody on the surface of the earth. This pressure varies from place to place depending upon the following factors :—

(*a*) *Temperature* :—A high temperature means a low pressure and *vice versa*.

(*b*) *Moisture* :—The presence of moisture decreases the weight of the air.

(*c*) *Altitude* :—Pressure decreases by 1″ for every 900 feet of ascent.

Pressure is measured by an instrument known as Barometer. There are various types of a Barometer. The most common is Aneroid Barometer. The meteorologist uses a Barograph.

The variation in pressure is expressed by means of pressure curve-line drawn on a graph paper.

Isobar is a line joining places of equal pressure.

There exists a permanent distribution of pressure in the world. There is low pressure at the equator. Two highs are situated near the tropics. The temperates have again two lows. Because of the difference of pressure, winds are caused, moving from a high pressure area to a low pressure area. The winds that are caused fall into the following categories :—

1. Permanent winds consist of two parts :—
   (*a*) Trade winds blowing from SE and NE direction between Equator and 30° N and S in the Southern and Northern hemispheres respectively.
   (*b*) Anti-trades or westerlies are those which blow between 30° to 60° North and South in the direction of S. W. and N. W. in the northern and southern hemispheres respectively.
2. Seasonal winds again fall into two types :—
   (*a*) Monsoons-blowing in summer in one direction and in winter from the other as the monsoons of India. They are due to migration of wind system and

due to unequal heating of land and sea.

(*b*) Land and sea breezes are caused due to unequal heating of land and sea. They blow from land to sea at night and *vice-versa* during the day.

3. Variable winds consist of :—

(*a*) Cyclones—A low pressure area surrounded by a high pressure area. It brings cloudy weather and heavy rain.

(*b*) Anti-cyclones—A high pressure area surrounded by a low pressure area. This is associated with fairly dry weather.

4. Local winds—Following are the typical examples of these :—

(*a*) Fohn-blowing in the Alps, hot and dry wind.

(*b*) Chinook-blowing on the leeward side of the Rockies. It is a hot dry wind.

(*c*) Sirocco—the wind of the Sahara.

(*d*) Bora and Mistral—cold winds of the poles blowing towards the Equator.

QUESTIONS

1. Describe the construction of a barometer and draw its diagram. (P. U. September 1943).

2. How can a barometer be used to measure the height of a place? Explain the principle upon which this use of barometer depends.

3. Define : isobar, cyclone, and anticyclone.

4. Show by means of a diagram the distribution of high and low pressure in the world.

5. Describe the various types of winds that you know.

CHAPTER XVIII

RAIN

Causes of rainfall.—It is a proved fact that evaporation is always taking place from the surface of oceans, seas, lakes, rivers and ponds. It is natural then, that the atmosphere contains water vapour. This amount of water vapour in the atmosphere may vary from time to time at the same place and from place to place at the same time. When air laden with moisture rises upwards, it is cooled because of coming in contact with colder air above and because of expansion due to reduced pressure. When the air cools it can no longer hold all the water vapour it previously contained in it. Therefore, condensation of the moisture takes place round some dust particles and forms clouds. Thus clouds may be defined as particles of water floating in the air. When these clouds have to rise still more in upper regions, the smaller particles of water continue to form bigger drops which become so heavy that they cannot be supported by air. They then begin to fall as drops of rain. Thus cooling of the saturated air is the primary cause of rainfall. Air is said to be saturated when it cannot hold any more moisture at a given temperature.

Types of rainfall.—Winds cause rainfall if they are condensed in one of the following ways.

1. When they blow from warmer regions to cooler ones.

2. When winds are compelled to rise against a mountain.

3. When cyclones accompany winds.

Rainfall is classified according to the way in which condensation of the winds takes place.

1. **Convectional rainfall.**—In the equatorial regions which are situated between 5° north and south, convectional type of rainfall takes place. Owing to great heat a low pressure area is caused and therefore, ascending currents of air known as, convectional currents are caused. This rising air is full of moisture because there is great evaporation. The moist laden air which rises is condensed and sheds heavy rainfall. Since convection plays an important part, therefore, the rainfall is called as convectional. This type of rainfall also takes place in tropical countries. Thunder storms are most frequent in this type of rainfall.

2. **Relief rainfall,**—Such a type of rainfall is caused by the relief of the land. In this case winds have to rise up a mountain, condensation takes place which causes heavy rainfall. The rate of condensation is 0·6°F for every 300 feet of ascent. Nearly 80 per cent of the rainfall of the world takes place due to this process. There are many examples of this type of rainfall. In India monsoon winds have to rise up the Western Ghats and give heavy

rainfall to western coasts. Similarly, windward side of the Rockies in the temperate region gets very heavy rainfall. That side of the mountain along which the winds have to rise is known as the windward side and the other side as the leeward side. In the leeward side there is always a little rainfall because of warn descending currents. It is also known as Rain shadow area. (Fig. 10).

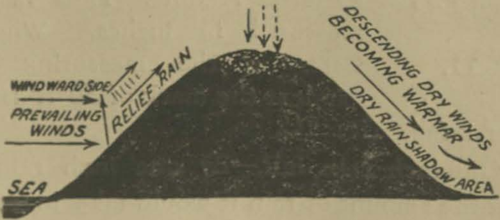


Fig. 10.

Relief rainfall and rain shadow area.

(c) **Cyclonic rainfall.**—As explained before cyclones are low pressure areas. Therefore winds are always ascending. It was also explained how cyclones are always associated with cloudy weather and rainfall. These cyclones are very prominent i latitudes of 40°—60° N and South of the equato· Such a rainfall which is due to cyclones is called cyclonic rainfall.

Measurement of rainfall.—In order to measure the exact amount of rain which falls at a place we generally use an instrument known as rain-gauge. In its construction it consists of a metallic cylinder in which is fitted a metallic funnel which permits raindrops to pass through itself to be

collected in a bottle, in the neck of which is fitted the lower end of the funnel. When the rain has taken place the collecting vessel is taken out and the water is poured in a graduated cyclinder known as measuring vessel. The measuring cylinder is so graduated as to give the amount of rainfall in inches by direct reading. Thus rainfall is measured in inches. When the water in the measuring vessel stands at the mark of 50 it is equal to ½″ rainfall. (Fig. 11).

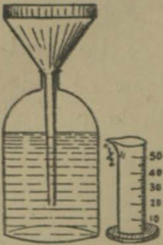


Fig. 11.
Rain gauge.

One inch rain fall.—By one inch rəinfall is meant the amount of rain it would take to cover a horizontal surface of land with water to a uniform depth of one inch provided that none had been lost by evaporation, by soaking into the ground or by flowing away.

Rainfall chart.—The thermometer and the barometer change continuously so that we can express sharp changes by a ccntinuous line known as curve line. But rainfall is not continuous and occurs at intervals only and therefore, should not be represented by a continuous line. Instead

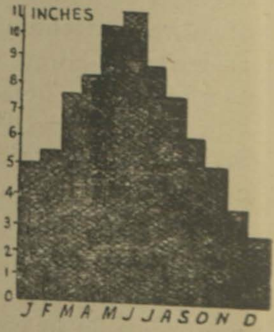


Fig. 12.
Rainfall Chart.

of drawing a line we draw little shaded rectangles as shown in Fig. 12.

Isohyet.—Isohyets are lines joining places having equal rainfall.

SUMMARY

Rainfall is due to the condensation of the moisture laden wind. The air picks up moisture due to the process of evaporation, condensation takes place when the air comes in contact with cold bodies. Thus evaporation and condensation are the two necessary processess for the formation of rain.

Rainfall is of three types :—

(*a*) Convectional rain is due to rise of convectional winds. The moisture present in the air condenses as in Equatorial regions.

(*b*) Relief rain occurs when winds have to rise to the top of a mountain. There, they condense and give heavy rainfall.

(*c*) Cyclonic rain is due to the cyclones which run between latitude 40° to 60° N and S of the equator. Cyclones bring heavy rainfall.

Rainfall is measured by an instrument known as Rainguage. It consists of two parts (*a*) collecting vessel (*b*) a measuring cylinder. When the measuring vessel is filled up to the mark of 50 it amounts to ½″ rainfall.

One inch rainfall is said to have occurred when the water stands to a height of 1″ on a horizontal

surface of the earth without any loss due to evaporation or soaking or flowing.

Isohyet is a line joining places of equal rainfall. Rainfall is expressed in the form of rectangles instead of a curve line.

QUESTIONS.

1. Give some account of the the causes of rainfall.

2. How is rainfall measured ? Where does most rain fall in India.

3. Name the various types of rainfall. Add a short account of the each.

4. Prepare a statistical diagram for the following figures, showing rainfall in inches.

January	...	2·05	July	...	0·69
February	...	2·48	August	...	3·23
March	...	2·82	September	...	3·20
April	...	0·81	October	...	1·27
May	...	2·19	November	...	0·87
June	...	0·67	December	...	1·78

(P. U. 1938).

CHAPTER XIX

WEATHER MAPS

Every country of the world has a Meteorological department of its own. Its business is to maintain daily and other records of the weather conditions ; to forecast weather ; and to publish daily and other weather reports, charts and maps. Meteorology is that branch of science which deals with the phenomena of the atmosphere with regard to weather and climate.

The Indian Meteorological department was founded in 1875 and has its headquarters at Poona. This department now maintains a number of observation stations all over the country. Each of these stations sends its weather reports once or twice a day to the head office. The observations are made at 8 hours which time is fixed internationally. When the observation time approaches, the observer goes out and makes the following observations with the help of the instrument noted against each.

1. Pressure—It is measured by a self-registering barometer known as Barograph and is expressed in the form of isobars.

2. Winds—The direction and force of winds are measured by instruments known as Wind-vane and Anemometer respectively. The direction of winds is expressed by means of certain notations as shown in the weather map (Fig. 42 Appendix E).

3. State of the sea and sky—This is again put in weather reports in the form of symbols. (Fig. 42 Appendix E).

4. Temperature—It is recorded by a self-registering thermometer known as Thermograph which contains both the maximum and minimum thermometers. Temperature is shown by means of isotherms.

5. Sun shine—It is recorded by an instrument called Sunshine recorder. It is a sphere made of crown glass 4″ in diameter and 3 lbs. in weight supported on a basement made of some metal. It is fixed in such a position that the sun shines on it throughout the time it is above the horizon. A graduated card is placed in the groove behind the ball. The card is charred at the points on which image of the sun falls. This card is replaced after sunset.

6. Rainfall—The rain gauge measures the amount of rainfall that has taken place in the past 24 hours.

7. Moisture in the atmosphere—This is measured by a thermometer known as Wet and Dry Bulb Thermometer. Its construction consists of two similar thermometers fixed on a frame side by side. The bulb of one is covered with muslin, the other end of which is dipped in a beaker containing water. The temperature of the wet bulb thermometer will always be lower than that of the other due to evaporation. Readings are taken from the two simultaneously. The difference of the two gives the saturated or unsaturated state of atmosphere.

When readings are made they are noted down in a weather map and a copy is sent to the Head Office at Poona At the same time ships in the Indian Ocean record their observations and send them to the Head Office.

The Indian daily weather report. The Indian Meteorological Department publishes the Indian daily weather report. This weather map gives a summary of the conditions over a large area and is based upon observations made at a number of stations and collected together at the central office. Such a map can be had from the office of the Director General of Observations, Poona. On the first page of the weather report is entered a summary of the observations made at 8 hours and giving

weather forecast for next 24 hours. The fourth page has got three maps, one showing pressure, winds and rainfall conditions for that day at 8 hours. On the second map the pressure departure at 8 a. m. from the normal and on the last is expressed departure of mean temperature of the day from the normal. The second and third pages contain certain statistical figures. Another map showing the weather conditions of the previous day is also added. A study of weather maps for a year will give you an idea of the climate of India. See Fig 42 (Appendix E).

SUMMARY

The weather map is prepared by the Sub-Stations of the Meteorological department. The weather conditions are taken at exactly fixed hour *i. e.* 8 a. m. and they are noted down in an outline map of India by using certain conventional signs and symbols. In a weather map the observer expresses the state of the sky, the amount and type of the clouds, if it is raining or showering, if visibility is good or bad. He also measures the direction and force of wind. He reads the temperature from thermometers fitted in a screen, He also reads the pressure and measures the amount of rainfall that has taken place. From the study of these conditions the weather for the next day is forecast. Thus it provides us with a very useful information.

QUESTIONS

1. Describe exactly how the material obtained by the Meteorological Office, Poona, is plotted to

form the daily weather map of India. What information can be had from the map ?

2. What is a weather chart ? How is it prepared ?

3. Give the principal features of the Indian Daily Weather Report to show your familiarity with it. When is it published and how are the data collected ?

4. What are the elements of weather ?
Differentiate between weather and climate,
(P. U. September, 1944).

CHAPTER XIX

MAPS ILLUSTRATING DIFFERENT TYPES OF DATA : STATISTICAL DIAGRAMS

Different types of data.—There is quite a large variety of data which can be expressed in the form of maps. We classify the whole available data into three types—(1) Climatic data (2) Distributional data and (3) Topographical data. Maps are named after the data they represent. A climatic map is one which shows data relating to climate, *e. g.* temperature, pressure and rainfall. A distributional map may show the distribution of stocks, crops, minerals and population. Their aim is to show the variation in value, amount or density of different distributions. Similarly, a topographical map will show data concerning relief, *e.g.* heights and depths. Let us study how each of the above types of maps is drawn in different ways.

1. **Climatic maps and illustrations** :—These maps show the distribution of temperature, pressure and rainfall. The distribution of temperature is shown by isotherms, pressure by isobars and

rainfall by isohyets. Such maps are known as climatic maps. Average temperatures and pressures for different hours of a day or for different days of the month or for different months of the year are represented by temperature and pressure graphs respectively. For comparison purposes two or more graphs are drawn in the same diagram. For instance, you may show the maximum and minimum temperatures of a place in a single diagram. Let us make an attempt to prepare a temperature graph to show the following average temperatures for different months of the year.

Jan.	37° F	July.	58° F
Feb.	39° F	Aug.	57° F
Mar.	40° F	Sept.	53° F
Apr.	55° F	Oct.	46° F
May.	49° F	Nov.	40° F
June.	55° F	Dec.	38° F

Draw two lines AB and AC at right angles to each other (Fig. 13). The horizontal line AB will show the time element and the vertical line AC the actual readings. Therefore along AB mark off at equal intervals letters J. F., M. etc, referring to the names of the months. Along AC write figures 30, 35, 40, & 45 at equal distances. On the vertical line marked J put a small cross against 37° line. On the line F put a cross against 39° line. In this way a number of points are obtained. Join these points. You get a curved line showing the rise and fall of temperature as shown. Sometimes points are not joined together to make a curved line but instead of

that, each point marked on the vertical line is joined with its respective temperature reading to give perpendiculars of varying heights similar to Fig. 20.

The average rainfall distribution is represented by shading which gets darker with the increase in the amount of rainfall. We shall study the merits and demerits of this method in the study of distributional maps.

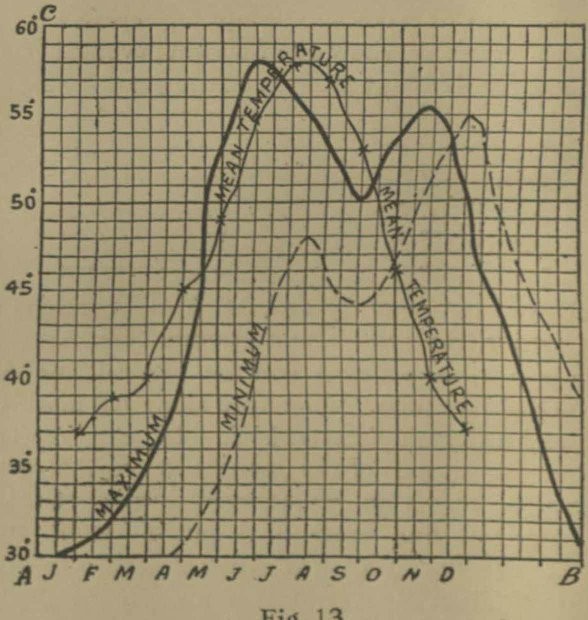


Fig. 13.
Temperature graph.

The monthly or the annual rainfall is best shown by vertical bars (Fig. 14 and 15).

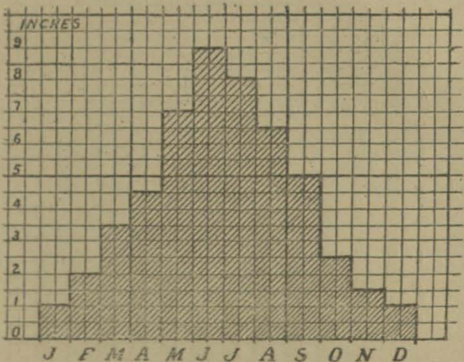
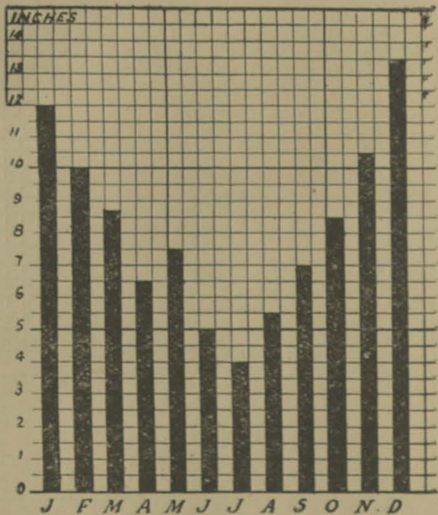


Fig 14.

Rainfall by vertical bars,

According to this method it is not possible to draw more than one diagram for the same place. Hence two diagrams are drawn separately for comparative study. It is a wrong method to show the monthly or annual rainfall by a line graph because unlike temperature it is not a continuous thing but instead, it occurs at intervals only.

2. **Distributional maps** :—These maps help the map reader in studying the cause and effect, say, of high or of low production of a crop or high and low density of population in an area. For this purpose, when these maps aye prepared relief, climatic and soil maps are placed along side. These maps fall into two categories : (a) Those showing



Fig, 15
Rainfall by vertical bars

the distribution of stocks and crops or minerals. (b) Those showing population. These maps are prepared in the following manner.

(a) STOCKS AND CROPS MAPS

(*i*) *Writing the name of the commodity* :—In the area where the particular commodity is produced the name of the commodity is written in bold letters, as for example, Rice, Cotton, Tea, Wheat. This method is not quantitative and does not convey any idea about the quantity produced in that area. On the other hand it does make mention of the crop grown. If for instance, the word "Wheat" is printed in the eastern Punjab it simply shows

that wheat is produced but does not tell us how much wheat is produced per acre in each district. Besides, this method does not take into consideration the relief of the area. Therefore because of these inherent defects the method is out of use now.

(ii) By shading or colour or layer tint method :— Here the distribution is shown by different methods of black and white shading or by tints of different colours or different shades of the same colour. The best plan is to use different shades of the same colour to show varying densities. If colours are used, it is safer to employ one colour for a single commodity and employing various shades for its various densities. The easiest and the simplest solution is to use black and white shading (Fig. 16 A). The

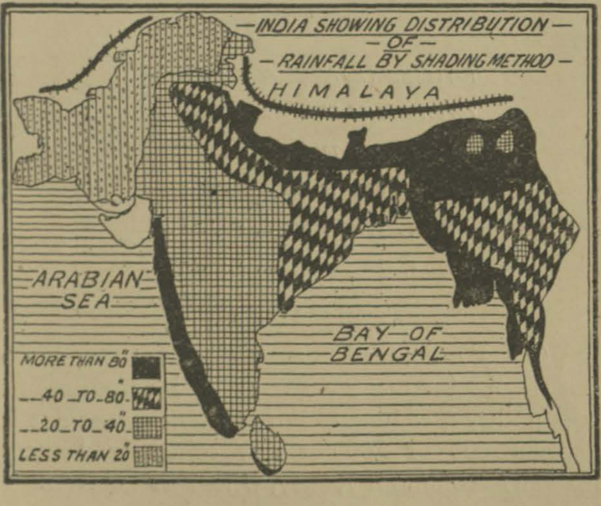
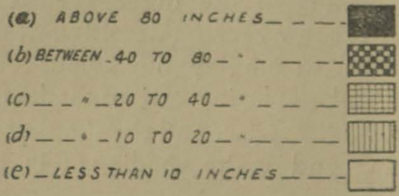


Fig 16-A.

success of the method depends upon the units selected which place limits for different shades. The units should be equally spaced and the shades should be well graded. To make this point clear two examples of the units and the shades, are given (Fig.16 B&C). The greatest defect with this method is that it gives a wrong idea of the uniform production of the commodity because it takes into consideration only averages.

(B)



(C)

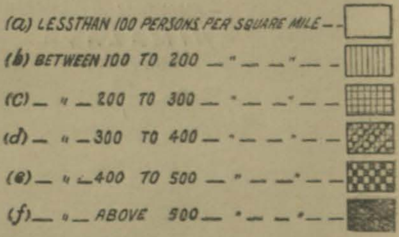


Fig. 16 B & C

(*iii*) By *dot method* :—In this method a single dot is used to show some fixed amount of the commodity produced. For instance, one dot may express 1000 or 2000 or any other fixed quantity for any commodity, say, wheat or cotton. The size of the unit to be expressed by each dot is

of great importance. It should neither be so small that too many dots may be required to insert which will only produce a blurred effect, nor should it be so large as to sacrifice the accuracy of the map. When the scale has been chosen the number of dots required for each district or province are calculated from the total production given for that district or province. Then the exact number of dots is inserted keeping a relief map and a soil map of the area along side. (Fig 17 Next Page).

If the unit to be represented by each dot is well chosen, the dot method turns out of great utility in giving absolute figures. Consequently this method is only employed when absolute figures are given. The main function of placing relief, climatic, and soil maps of the area alongside is that we neglect the area where commodity is not found or we put a lesser number of dots if the quantity found is very small. Similarly dots can be placed very close in areas of large production. Thus the dot method tells us at a casual glance the density of production. Besides, one can easily calculate the exact amount of production by counting the number of dots and then multiplying this number with the unit number represented by a single dot.

(*b*) **Population maps** :—The population statistics may again be of two types :—

(*i*) It may show the number of persons per unit area. Since these are average figures, so shading or colour method is generally employed.

(*ii*) It may give the actual poulation in that area. These being absolute figures the dot method is most commonly adopted.

Sometimes the shading and the dot methods are combined so that the same map may give the average and the actual figures. The data for the population map are collected from the census returns which are prepared by government once in ten years.

Merits and Demerits of Dot Method :—Apart from crops and population the dot method may also be used, (1) to locate the exact site of the coal mine in a coal mining area, and (2) to locate sites of fairs, market factories and towns. The size of the dot will determine the importance of the town. There are different forms of dots to be employed for this purpose and therefore any one of these may be used for locating the site. There are certain limitations attached with the population maps. Numbers are varying from .time to time. A map made on one year's figures will soon get out of date. Besides, the year selected may be an abnormal one. To overcome this difficulty these maps are based on statistics for an average of five years.

(3) **Topographical maps**—In these maps the subject to be represented is the relief of the land. Relief is the distribution of high and low lands of a country and it is shown by heights and shapes of various hill features. The following methods are employed to show the hill features :—

(*a*) *Contours* :—A contour is an imaginary line drawn on the map joining places of the same height above mean sea level. Thus if all points situated 100 feet above mean sea level are

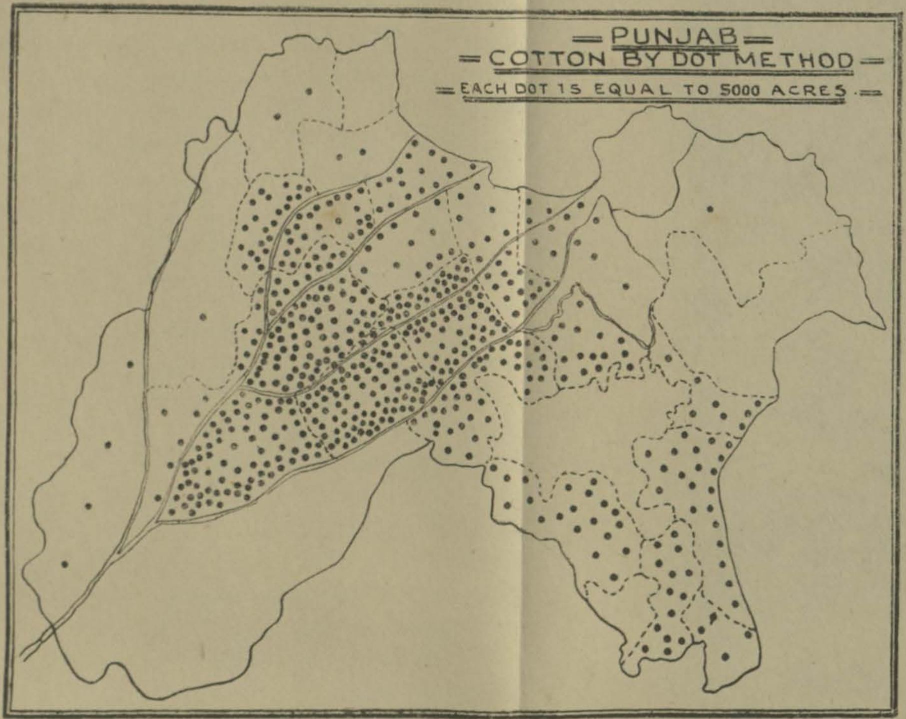


Fig. 17.

joined by a line, then such a line is called a 100 ft. contour. In this way a number of contour lines are drawn to show the height and shape of some hill feature. The vertical distance between any two consecutive contours is known as the Vertical Interval or (V. I). For example, if the contours are drawn at 50, 100, 150, and 200 feet apart the V. I. will be 50 feet. Generally, for a given map this vertical interval is always constant and is always expressed in feet. Thus V. I. is the difference between two consecutive contcurs.

The horizontal distanc between any two successive contours is known as the Horizontal Equivalent or (H. E.). This Horizontal Equivalent is always stated in yards and it varies all over the map. A small Horizontal Equivalent indicates a steep slope and a long one a gradual slope. A uniform H. E. would mean a uniform slope. These contours assume different shapes to show different relief features. Thus, a mountainous area will be shown by ellipses with increasing heights towards the centre. For a river valley the contours will be V shaped. It requires sufficient amount of practice to recognize the shapes of contours before one is able to interpret from contours the relief features of the land. Similarly, representation of relief features with the help of the contours demands imagination, intelligence and mastery of the various shapes of contours.

Students have already been told in Chapter IX how to make young pupils familiar with contours.

These contours are drawn either with Dumpey Level or Clinometer or with Baromter. Students need not go into the details about the working of these instruments.

(*b*) *Hachures*:—They are short disconnected lines drawn towards the slope. They follow the direction in which water would flow freely. Like contours they are made short and close for steeper slopes. They do not give the actual heights and this is the main drawback with this method.

(*c*) *Form Lines* :—They are contour lines but broken and also not figured. These too do not show actual heights but only the general relief of the land.

(*d*) *Hill shading*.—This method conveys the general idea of the relief of the country and is emyloyed in small scale maps. The hill and mountain sides are shaded black while plains, plateaus and valleys are shaded light.

(*e*) *Layer Tints* :—In this method tints or layers of a colour are used to show the topography of the land, Depths, rivers and oceans are shown by blue colour, low lands by green and high lands by brown. This is the most popular method because it is easy and clear cut. This method is most commonly employed in atlas and wall maps.

STATISTICAL DIAGRAMS

In these diagrams dry figures are changed into readable diagrams. They are of the following types :—

(*a*) **Line graph.**—This method is the same

as we followed in drawing temperature or pressure graphs. (Fig. 13). It is based on the fact that one variable changes with reference to the other. One of the two variables is usually the time—days, months or years. This is again illustrated by Fig. 18 which shows the variation in the production of rice in Bengal over a number of years.

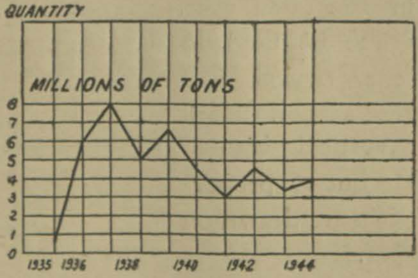


Fig. 18.
Line graph.

(*b*) **Bar graph.**—This is another way of showing variations. The exports of India for the year 1924—25 are shown by Fig. 19 and the export

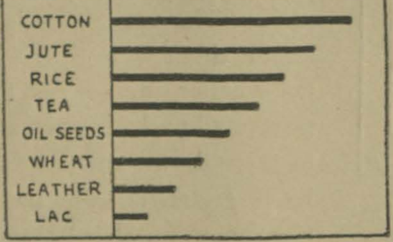


Fig. 19.
Exports of India for the year 1924-25.

of wheat from different countries is represented by Fig. 20. These figures may be drawn to compare the productions of one commodity over a number of years or of different commodities in the same year. They may also be used to compare the trade of a country or countries. Horizontal or vertical bars of equal widths but of proportionate lengths are drawn on a graph paper.

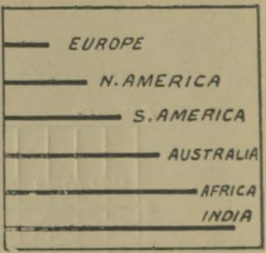


Fig. 20.
World Export of Wheat.

(c) **Rectangular diagram** :—In this diagram a large area or a continent is sub-divided into smaller areas each of which is represented by a rectangle. The area of the sub-region is in proportion to the value it represents. The start is made with the larger division and is arrived at the smaller one by halving it proportionally. It becomes very easy if it is drawn on a graph paper. Each rectangle contains the proportionate number of squares and one small square on the graph paper corresponds to a round number of units (Fig. 21).

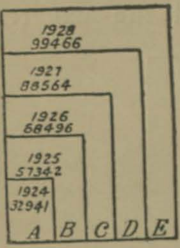


Fig. 21.
Rectangular diagram.

A modified form of the rectangular diagram is shown in Fig. 22.

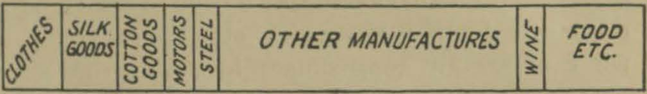


Fig. 22 (After Dudley Stamp.)
Rectangular diagram showing exports of France.

(*d*) **Wheel or Circle diagarm** :—It is another method of showing comparative distribution (Fig.23). The circle denotes the world production of cotton. While each section represents the contribution made by U. S. A , India, Egypt and others to the total production, the value of each section is calculated by the following mathematical process. A circle has 360° in all and therefore the total production is made equal to this figure.

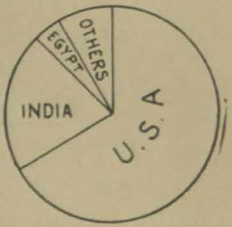


Fig. 23 (After Dudley Stamp)
World production of raw cotton.

Thus the total production T=360°

Therefore the contribution of U. S. A.

$$=\frac{360\times \text{U. S. A}}{\text{T}}$$

=degrees ?

It should be remembered that the production of each country will be given and we have simply to convert it into degrees.

This method gives the average figure only and therefore for actual amounts we have to resort to the dot method which alone gives absolute figures. Thus we can get an approximate idea from the wheel diagram.

N. B.—The following are the chief sources from where data for these maps may be callected.

1. The Indian Year Book.
2. The census returns of India will provide data for population maps.
3. Agricultural statistics of the Punjab provide figures for the production of agricultural crops.
4. The Statesman's year book.
5. Statistical Abstract of India.

SUMMARY

There is quite a large variety of data which can be put in the form of maps and diagrams. The different types of data are (1) Climatic (2) Distributional and (3) Topographical. Maps are named after the data they represent.

Climatic illustrations are those which show the distribution of temperature, pressure and rainfall. Temperature and pressure are shown by temperature and pressure graphs respectively. The monthly or annual rainfall is shown by rectangles or bars. Average rainfall is shown by shading method.

When the temperature, pressure and rainfall are shown by isotherms, isobars and isohyets respectively, the maps thus prepared are known as climatic maps.

Distributional maps show the density, the

amount and the value of the distribution of stocks, crops, minerals and population. Stocks, crops and minerals are represented by the following three methods. (1) Writing the name of the commodity or crop or mineral. This is an old and unimportant method. (2) Shading method is useful when average figures are given. (3) Dot method is only employed when absolute figures are stated. Out of these three the dot method is the most reliable. It also enables one to locate sites of towns.

The distribution of population is shown by two methods. (1) Shading method is used when persons per unit area are given. (2) The dot method is employed when actual population is given.

The topographical data represents the height and shape of the relief features of an area. These are shown by (1) Contours, (2) Hachures, (3) Forms lines, (4) Hill shading, (5) Layer tints. The contour method is the most common for large scale maps and the layer tint method for small scale maps, for atlas and wall maps.

Statistical diagrams aim at converting dry figures into interesting readable diagrams. These are of the following types. (1) Line graph. (2) Bar graph. (3) Rectangular diagram. (4) Wheel or pie or circle diagram. These are all simple and easy to draw. They are very useful because they enable comparative studies.

QUESTIONS

1. (*a*) Describe carefully the data you would require for the construction of agricultural maps of the Punjab.

(*b*) Discuss and illustrate the methods you would adopt to construct a map of the Punjab showing the distribution of wheat cultivation.

2. What are the various methods you would adopt to represent diagramatically the statistics of production ? Illustrate. (P. U. 1944).

3. What do you understand by the Dot system employed in the preparation of distributional maps ? What are its advantages ? When does this system fail ? Give examples.

4. What are the different methods of geographically representing geographical statistics ? Illustrate your answer with relevant diagrams. (P. U. 1945).

5. Represent graphically the population of the following towns :—

Town	*Persons*	*Males*	*Females*
Lahore	400075	253846	146229
Amritsar	263210	157823	105387
Rawalpindi	75767	46086	29681
Multan	108351	60800	47551

CHAPTER XX

CALES : THEIR MEANING AND CONSTRUCTION

Necessity of having a scale.—We have studied so far that map is the chief instrument of learning and teaching. In fact map is the shorthand of a geographer. It is the chief tool in the hands of the teacher of geography. Considering its vital importance one is concerned with the problem of map drawing. In a map the area that we represent is much smaller than the actual area, but it is at the same time quite proportionate in every detail to the original surface. Such a map of area whose dimensions are in proportion to the actual area is said to have been drawn on a scale. A map without a scale is meaningless. It then becomes a rough sketch. So, in order to be accurate in every respect the map should always be drawn on some scale.

The meaning of the scale.—A scale expresses the proportion which a length between two points on the map bears to the actual distance between similar two points on the ground. For example, suppose the distance between General Post Office and Queen's Statue is one mile and we show

these two points by one inch line on the map then the relation that exists between these two distances will be called the scale of the map. In the above case it is one inch to one mile. In simple words it means that the distance of one mile on the ground is represented by one inch line on the map.

Methods of indicating scale :—The following are some of the common methods of showing the scale of the map :—

1. **Statement method** :—This consists in saying that so many inches to a mile or so many miles to the inch. It is always written as 1″=5 miles, 10 ft.=1″. or 1 mile=1″, or 5″=1 mile. This is the simplest method of indicating scale on the map.

The scale may be large or small. Small scales are scales of miles to the inch, *e. g.*, 5 miles=1″ or 50 miles=1″.

It means that such a large distance of 50 miles is represented by such a small line as 1″. The maps drawn in atlases are generally on a small scale because very large areas like a continent or a country are shown on a small piece of paper.

On the other hand large scale maps are scales of inches to the mile, *e. g.* 2″=1 mile or 6″=1 mile. It implies that a distance of 1 mile is represented by 2″ or 6″ line, while as in the previous case a distance of 50 miles is represented by 1″. The survey maps, military maps and plans of buildings are prepared on a large scale.

2. **Representative fraction method** :—In this method the relationship between the distance on the ground and the length of the map is shown by a fraction, while in the statement method it is expressed in the form of an equation. Such a fraction is known as the Representative Fraction and is usually abbreviated as R. F. Thus *e. g.* R. F.=Map length/Ground distance or 1/63360. (1 mile=63360 inches).

This means that one unit of length on the map is equal to 63360 units of the distance on the ground. It may mean that 1" on the map is equal to 63360 inches on the ground or 1 cm. on the map is equal to 63360 cms. on the ground. It should be remembered that the denominator and the numerator should be in the same units and the numerator is always 1.

This is the most suitable method of indicating a scale as it can be expressed in any unit desired and not only in inches or feet or miles or yards. Now a German or a Japanese will not be able to follow the scale if expressed by the Statement Method. On the other hand he can very easily follow it if the scale is expressed in the Representative Fraction, because in this case he can convert the denominator and the numerator in the unit which he understands. Thus we have seen that this method is of universal application. Besides, the method of converting from statement to R. F. and *vice versa* is easily calculated. The following are simple rules to convert one from the other.

1. **From R. F. to statement.**—To find.

(*a*) *The number of miles to an inch.*

(*b*) *The number of inches to a mile.*

(*a*) Divide the denominator of the fraction by 63360. It should be remembered that one mile is equal to 63360 inches.

e. g. If R. F. is 1/1,000,000 then 1000,000/63360 = 15·79 miles; therefore the statement of the scale is 1″ = 15·79 miles or 16 miles (approximately).

Scale 1″ = 16 miles approximately.

(*b*) Divide 63360 by the denominator of the fraction.

e. g. if R. F. is 1/50,000 then 63360/50,000 = 1·27 inches.

therefore the scale is 1·2 7″ = 1 mile.

2. **From statement to R. F.**

(*a*) *When number of miles to an inch are given* :— The rule is to multiply 63360 by the number of mile to an inch in the given scale and this will give you the denominator of the R. F.

Scale given is 1″ = 5 miles.

then 1″ = 5 × 63360 inches

therefore, R. F. is 1/316800.

(*b*) *When number of inches to a mile are given.*— Divide 63360 by the number of inches to the mile in the given scale and the resulting number will be the denominator of the R. F.

Example.—Scale given 2 inches to a mile.

According to the rule = 63360/2 = 31680 inches, therefore, R. F. is 1/31680.

3. **Linear or plain scale.**—This is a method to show the scale in a graphic form. It consists in dividing a calculated line into an equal number of parts to show miles or any other unit desired. One of the major divisions is subdivided into equal number of parts to show yards or miles, etc. The aim should be that each part should represent some round figure as 5, 10, 15, 20, etc. On the map the scale is shown either at the top or bottom in any one form as shown by (Figs. 24 and 25). The

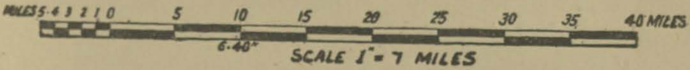


Fig. 24.
Linear Scale.

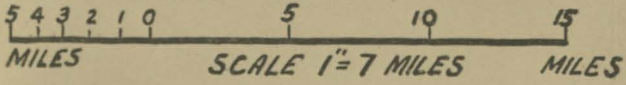


Fig. 25.
Linear Scale.

secondary divisions in this scale are always made on the left hand side and the start for major divisions is made with zero. Thus the position of zero is on the extreme left of primary divisions or on the extreme right of the secondary divisions. This is the most common method practised in modern times.

Method of constructing a linear scale.—Let us construct a linear scale for 1″ = 7 miles.

If 1″ is equal to 7 miles, then 6 inches will be equal to 42 miles. Always take some nearest whole number of this figure. In this case it is 40. Now

if we divide 40 into 8 equal primary parts then each part represents 5 miles. In order to divide a primary part into secondary divisions then we should add one more part. Thus the total number now comes to 40 · 5=45 to be divided into 9 parts so that each part may show 5 miles.

Then if 7 miles are represented by 1″, we should determine the number of inches required to show 45 miles.

i.e., 45/7=6·4 inches

Then take a line AB 6·4 inches long and make an angle BAC of 40° (Fig. 26). Mark 9 equal divi-

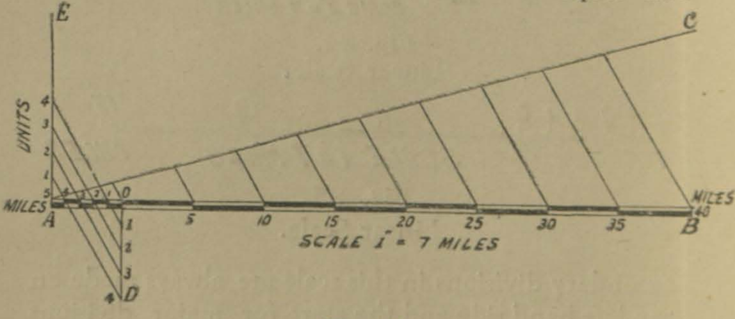


Fig. 26.
Showing construction of linear scale.

sions on the line AC. Join BC. With the help of set squares, draw parallels to BC from each division so that the line AB may be divided into 9 equal parts. Leave one part on the left hand side and mark the next as zero and proceed as 5, 10, 15 and 20 miles. In order to make secondary divisions draw two perpendiculars in the opposite direction from o and A respectively. Then mark 4 equal divisions

(one less than the actual number required) on AE and OD. Then join points 1 with 4, 2 with 3, 3 with 2 and 4 with 1. The distance Ao will then be divided into 5 equal parts. Thus the whole line is divided and it enables us to measure any distance required beginning from one.

4. **Time scale.**—It is a scale prepared to measure the time required to cover a given distance. It is based on the principle of linear scale.

SUMMARY

A scale is a necessary element of the map. A map without a scale is meaningless. A scale expresses the relation between the distance on the ground and the length on the map. There are different methods of indicating scale on the map.

(1) Statement method (2). Representative Fraction method. (3) Linear scale method.

Out of these the R. F. method is the most convenient and easy to follow. This method is of universal application. The linear scale method is also very common.

The time scale enables one to measure the time taken to cover a certain distance. Its construction is based on the principles of linear scale.

QUESTIONS

1. Convert the following scales into R. F.

(*a*) 6 inches to a mile (*b*) 1 centimeter to 1 kilometer.

2. Construct a scale 4 inches to a mile.

3. Construct a scale of 1/1000,00 to show miles

4. Change the following R. F. into statement.

(*a*) 1/5000000 to show how many miles are represented by one inch.

(*b*) 1/100000 to show how many inches represent one mile ?

5. Find the R. F. of the following, 5 miles=1″, and 6 inches to a mile.

6. Measure out in miles from the railway map of India the distance between Delhi and Calcutta and Lahore and Madras.

CHAPTER XXI

ELEMENTARY SURVEYING

Meaning of the term " survey ".—When a map of a certain area is to be prepared its dimensions have to be measured. If the area is very small it is easy to make measurements with a foot rule or a yard or even a tape, but if the area to be represented on the map is very large it is necessary to use a much longer measure. Such a measure is the chain. Thus the term, " surveying " means methods of making measurements in the fields which will form the basis of map making. In technical language it is defined as "the science which determines the boundaries and superficial extent of any portion of the surface of the earth ". There are different methods of surveying, (1) Chain survey, (2) Plane table survey, (3) Prismatic compass survey.

CHAIN SURVEY

When we measure the boundaries of a certain area, whose map is to be prepared, purely with a chain it is called chain survey. This type of survey requires the following instruments :—

1. **Chain and arrows.**—There are three kinds of chains that are in common use: the 50 feet chain, the 66 feet chain, and the 100 feet chain. These chains are made of metal and are meant for rough use on the road. Out of these three the 66 feet chain, also known as Gunter's chain, is the most popular. It consists of 100 links with a tab fixed at every tenth link. The total length of the Gunter's chain is 22 yards or 66 feet. Thus, each link is less than a foot. In other chains mentioned above each link is one foot long. Every chain is provided with ten arrows, made of iron or steel and pointed at one end.

2. **Tape.** Sometimes tape is used in conjunction with the chain which then demands that all readings must be converted in to yards. Such a surveying is termed as chain and tape survey.

3. **Field Book.**—This is a notebook for entering readings made during survey in the field. It has two parallel lines ½ inch apart. The column thus formed corresponds to the lines walked by the surveyor. The entries are made from the bottom of the column and proceed upward. At every turn of the line of survey a short line is drawn in the chain column and the turnings are marked as A, B, C, etc. The offsets are entered on the right or left of the chain column as the case may be. (Fig. 27).

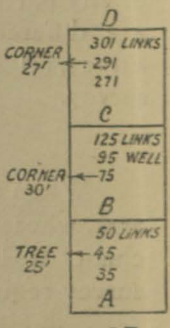


Fig. 27
Field book

4. **Flags or Poles.**—Coloured flags are used to fix positions on the ground.

METHOD OF SURVEYING

Let us suppose that you are asked to survey the irregular school ground A, B, C, D, E (Fig. 28). Before you start measuring its boundaries it is necessary that you should look round the field and draw an outline plan of it. Write down letters A, B, C, D and E, at each corner. Now measure the diagonal AD by fixing two poles one at A and the other at D. Stretch your chain along the line AD. The person who carries the chain towards D is known as the leader and the other who stands at A and follows the leader is known as the follower. When the chain is stretched the leader turns towards the follower who guides the leader with hand signs to be in line with AD. When the chain is fully extended the leader fixes an arrow at his position. The follower occupies the position of the leader (judging from the position of the arrow) who moves ahead towards D point.

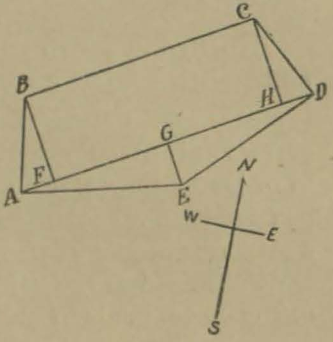


Fig. 28.
Field to be surveyed.

Offsets.—At certain intervals along the AD perpendicular distances are measured with the help of flags and tape. These are known as offsets. In

order to mark the position of B fix a flag there. Then at an interval of AF measure the perpendicular distance BF with the help of a tape. Similarly measure perpendicular distances GE and HC. Thus you have been able to fix on the map the corners A, B, C, D and E, by taking offsets to B, C, and E, from the main path AD.

North and South points.—Setting of a map is an important term in connection with map work. It means that the North point of the map must correspond to the actual North pole. Therefore, in order to draw North and South points we use a box compass. It consists of an oblong metal box with a magnetic needle suspended freely over a pivot, which is fixed in the centre of the box. The lid of the box is made of glass to enable one to look through the position of the needle. The magnetic needle when freely suspended always points towards North and South. In order to mark North and South points one has to draw only the outline of the box and make two arrows on the boundary lines pointing towards the north side.

When rough readings have been entered in the field book then actual plan is prepared from these measurements. The map is so set that its top usually corresponds to the actual North.

PLANE TABLE SURVEY

This method is also simple and is more accurate than the chain survey. It is also a valuable means

of filling in the details of the area shown in the map. It consists of the following instruments :—

1. **Plane table and tripod stand.**—It is a drawing board 18″×24″ fitted on a tripod stand 4 feet high. Its legs should be strong and rigid (Fig. 29).

2. **Alidade.**—It consists of a ruler graduated or ungraduated made of wood or metal. At its two ends are fixed hinged sights. The front sight has a wire fixed vertically through a wide slit and the back sight has only a narrow vertical slit. (Fig. 29).

3. **Box compass.**—It is used for setting the map. (Fig. 29).

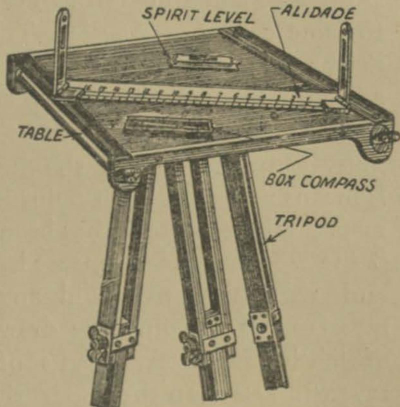


Fig. 29 (after Bygott)
Plane table, Spirit level, Box compass and Tripod.

4. **Spirit level.**—This is employed to make the table in level with the ground. (Fig. 29).

5. **Poles or flags** are used for fixing position on the ground.

6. **Chain and arrows.**—With the help of these distances are measured.

METHOD OF SURVEYING

First of all, a suitable position A is chosen in the field by the surveyor. This is the point from where a good view of the area can be had. The table with a big piece of

paper pinned on it is levelled at this position, Then another point B on the ground is selected wherefrom again the whole view is to be had. The position of the point A is marked on the paper by fixing a pin vertically above the point A. The distance between A and B is measured with Gunter's chain and is drawn on the paper according to some convenient scale. Then with the help of sight rule or alidade all the points to be entered are sighted and their rays are drawn from A, Before the table is moved to position B the map must be oriented with the help of box compass. It means that the North point is to be shown on the map. When the table has been shifted to position B the whole order is repeated. The table is levelled and reoriented to avoid any discrepancy. Then rays from same point are drawn at B with the help of sighting rule. The points of intersection of two rays will locate on the paper the actual positions of objects. These points when joined will give us the map of the area desired.

PRISMATIC SURVEY

This is another method of surveying. Since it is out of course so only a brief reference is made. The instrument is a box graduated in degrees containing a magnetic needle. The direction of the object is measured by pointing the compass in line with the object and thus taking its reading from the prismatic compass. In order to measure distances the chain is stretched on the ground along which the surveyor walks. These readings are entered in

the field book as explained before and finally actual map is prepared on some suitable scale.

SUMMARY

Surveying is the basis of preparing maps. There are three kinds of survey.

1. **Chain survey.**—The area is surveyed purely with the chain and arrow. This gives only a rough plan.

2. **Plane table survey.**—It is done with the help of plane table and alidade. We draw rays from objects with the help of sighting rule. This is very accurate and simple method of drawing a plan. It also enables us to fill in topographical details.

3. **Prismatic survey.**—It is a rough method of surveying very long distances.

Orientation or setting is a term which means that the North point of the map must correspond to the actual north.

QUESTIONS

1. Explain when you would use a plane table for map making and when you would use the surveyor's chain. Give reasons.

2. Draw a plan from the following readings:

	to D	
	600	
350 F. ←	560	
	430	→ 110 to C.
90 E. ←	220	
	100	→ 200 to B.
	0	measured in links
	A	

3. Give the names of the instruments required for plane table survey.

CHAPTER XXII

INDIAN ORDNANCE SURVEY AND OTHER MAPS

Maps are classified according to (1) size of the scale and (2) contents of the map.

1. Maps according to size of the scale are of the following types :—

(*a*) **Cadestral maps.**—They are drawn on a very large scale upto 25 or more inches to a mile.

(*b*) **Topographical maps.**—They are also drawn on a large scale. Its scale ranges from 1″ to a mile to 4 or more inches to a mile. They are also known as ordnance survey maps.

(*c*) **Chorographical maps.**—They are small scale maps of the various parts of the world showing typical features by conventional signs. Our atlas maps fall into this category.

(*d*) **World maps.**—Are also small scale maps to show the whole world.

2. These maps are classified according to some important feature which is shown in it. They are :—

(*a*) **An outline map** shows only the boundaries of the country or continent.

(*b*) **A political map** is one which shows the political boundaries, provinces, districts, towns, rivers and railways.

(*c*) **A relief or physical or orographical map** represents the nature of the land surface by means of colours and tints.

(*d*) **A bathymeteric map** shows the depths of the oceans with tints of blue colour.

(*e*) **A bathy orographical map** is a combined map showing depths of oceans and heights of land surface.

(*f*) **An ethnographical map** locates the distribution of races of mankind.

(*g*) **A vegetation map** is one showing the distribution of vegetation.

(*h*) **A biological map** shows the distribution of flora and fauna.

(*i*) **A weather map** is a map showing the distribution of temperature, pressure, and rainfall for a day only.

(*j*) **A climatic map** is one which shows either the distribution of temperature, or rainfall or pressure or winds or a combination of all these for a particular seasou as, for example, climatic map of India showing winter or summer conditions.

(*k*) **A distributional map** shows the distribution of some commodity or stock or crops.

(*l*) **A commercial or economic map** shows the area of production, distribution of exports and imports and density of population and railways and other routes.

(*m*) **A geological map** shows the distribution of rocks. Geology is the science which studies rocks.

(*n*) **A topographical map or ordnance survey map** is a large scale map showing the details of relief or topographical features and drainage.

(*o*) **The international map** is an ordnance survey map drawn on a scale of 1=1000,000. It is divided into sheets having uniform scales and signs. Each sheet showing some parts can be fitted with other sheets to show the country as a whole. It is drawn on the co-operation of the countries of the world.

INDIAN ORDNANCE SURVEY MAP AND ITS READING

The Survey of India have prepared these maps of nearly all parts of India and adjacent lands. These maps show greater details of relief (high and low land surface) or topography and drainage, etc. Conventional signs and symbols are employed to show these various types of details. The ordnance survey maps are not very difficult to be recognized because of certain common characteristics. For instance, every sheet bears its own sheet number and a scale. Even signs and symbols that are

employed differ very minutely. These maps are prepared on the principle of plane table and triangulation survey. The whole country is divided into triangles by means of theodolite. Triangulation is a system of measurement based on the truth that if one side and two angles are known the lengths of other two sides can be calculated. The word "Ordnance" means cannon or artillery. Since these maps are of great value to military personnel hence the word ordnance. Each sheet contains 4 degrees of latitude and 6 degrees of longitude up to 60° Lat. From 60° to 88° Lat. each sheet shows 4 degrees of latitude, but 12° of longitude. There are various types of ordnance survey maps. The best known and the most popular is the one inch map. There have been various editions of this map. The other maps are 6 inches, 25 inches to a mile and 1 inch to 1 million inchs. These maps differ from one another in the use of conventional signs.

Map reading.—Since map reading is the ultimate aim of geography teaching in schools, it is desirable that some introduction to Indian Ordnance survey maps be made and their reading be practised by setting some suitable and well graded series of questions and exercises. Map reading may be done in the following systematic order :—

I Step. **Marginal information.**—The following informatiom must be gathered from the map :—

(*a*) The sheet number.

(*b*) The name of the area shown.

(*c*) The scale usually drawn at the bottom of the map.

(*d*) Calculate the area of the region shown.

(*e*) Note the conventional signs entered there.

Conventional signs.—Following are some of the common standard signs that are employed by the Survey Department of India.

(*a*) **Roads** are shown by double red lines. Paved roads are represented by continuous lines and unpaved by dotted lines.

(*b*) **Railways** are shown by double black lines with short ticks between them.

(*c*) **Rivers and canals** by blue lines.

(*d*) **Trees** are shown by signs of trees. An orchard is expressed by drawing these trees in some order.

(*e*) **Buildings** are represented by solid black or red colour. There are other symbols also. For instance, P stands for Post Office, T for Telegraph Office. Usually, all the conventional signs and symbols that have been employed in a map are shown on that particular sheet.

II Step. **Study of Physical geography of the region.**—In this step the relief of land is studied with the help of contour lines or layer tints or hill shading. Even spot heights do convey some meaning of the topography of the land. Slopes,

heights, waterfalls, the shape of valleys and gaps, etc., have to be interpreted from the map.

Next comes the hydrography or drainage system of the region. The names and directions of the rivers have to be noted down. The existence of lakes, tanks, wells and water partings have to be found out. If it is a coastal area then coastal features are to be studied also When sufficient practice is gained attempts be made to reason out the nature of rocks and soil present there.

III Step. **Vegetation.**—Since vegetation is determined by physical factors like the relief, climate and soil, it will not be difficult then to describe the vegetation of the regions also.

IV Step. **Human geography.**—Here the aim is to interpret the action and inter-action between man and physical factors. This is done by drawing sketch maps of communications, and human settlements. It involves the study under the following heads :—

(*a*) **Historical Geography.**—In order to know the history of the land resort should be made to the presence of forts, old buildings, temples, churches, burial grounds and other monuments.

(*b*) **Agriculture and land utilization.**—The whole land shown is classified into (*i*) Forested area (*ii*) Marshy area (*iii*) Arable land (*iv*) Pasture land (*v*) and Desert land. Irrigation works are studied from canals and tubewells shown therein.

(*c*) **Means of communication.**—The development of the land is judged from the existence of railways and roads, sea and air ways.

(*d*) **Human settlement.**—The sites of town are examined and if possible geographical causes are put forward for the growth of towns.

(*e*) **Industries and occupations.**—The existence of mills, factories and mines, will determine the cultural stage of the region. This will enable the map reader to judge the main occupations of the inhabitants also.

V Step. **Conclusion.**—Finally, the whole area studied is divided into its natural regions keeping in view the relation between physical factors and man.

The teacher of geography should aim at enabling the child to read a map independently. It is because, map is the chief instrument of learning and teaching geography. In order to be successful in his mission the teacher should in the initial stages offer to students for study purposes, survey maps of areas known to his pupils.

SUMMARY

There is quite a large variety of maps. Each map has its own function to perform. Some of these maps are of school use while others are for the use of advanced students. Survey maps are prepared on the principles of triangulation and plane table survey. Children should be given

practice in map reading. Before they are asked to read a map they should be made very familiar with the conventional signs that are employed. It will be a better plan if the teacher should read two or three maps to the students. Then he should let each pupil select a map of an area well known to him and study it under his guidance.

QUESTIONS

1. Calculate the area of the region shown in some ordnance survey map.
2. Measure out the length of the railway line between any two towns.
3. What is an ordnance survey map ?
4. Write a systematic geographical account of any survey of India sheet. Scale 1″ to a mile.

PART III

APPENDIX A

DETAILED NOTES OF A LESSON

Subject	...	Geography.
Topic	...	Geography of Mexico.
Class	...	VIII.
Date	...	1st February, 1945.
Time	...	50 minutes.

Apparatus.—Ordinary requisites of a class room, coloured chalks, a map stand, a political and a physical map of Mexico or N. America.

Aim.—(1) To explain the influence of physical factors namely, situation, relief features and minerals in Mexico on the progress of mankind (2) To broaden the outlook of pupils by giving them new facts.

Previous knowledge.—Pupils have already studied N. America, Canada, and U. S. A. in outlines.

Introduction.—The to-day's topic will be introduced by referring to the political divisions of N. America.

Name the countries included in the Continent of N. America (Canada, U. S. A., Mexico, New foundland, Alaska and Central America.)

Some pupils will be asked to point out on the map the boundaries of Mexico. Then the teacher will make an announcement of to-day's topic, " We shall study to-day the geography of Mexico ".

Presentation.—The whole matter to be studied is divided into the following steps to facilitate assimilation :—

Step I. POSITION AND TOPOGRAPHY OF MEXICO

Matter.	Method.
Mexico is situated to the south of U. S. A. and consists of a broad high plateau, a prolongation of the Rocky mountain plateau of U. S. A.	A physical map of N. America will be presented and pupils will be asked to show the boundaries of Mexico.
The plateau is broad in the North and tapers towards the south. There is a narrow coastal plain on either side of the plateau.	Such a great diversity in the topography of Mexico will be emphasized with reference to tints of colours employed therein.
On the west is the long mountaneous peninsula of lower California. Similarly Yukaton lies towards the south east.	Here again use will be made of the political and physical maps of N. America to show the position of the peninsula. In order to know the grasp of the matter the teacher will put the following questions :— Divide Mexico into its physical divisions (three divisions). (*a*) Coastal plain. (*b*) Slopes of the hills. (*c*) Plateau. While the pupil is answering, the teacher will prepare on the blackboard with coloured chalks, an outline map of Mexico showing the three divisions as shown in.(Fig. 30)

Step II. THE STUDY OF CLIMATE AHD ITS BEARING ON MAN AND HIS ACTIVITIES.

(*a*) **Climate**

Matter.	Method.
The Tropic of Cancer divides Mexico into two parts. Therefore, it has got the tropical climate. The coastal plains are hot and attract heavy rainfall. The flanks of the plateau are cooler and attract a good amount of rainfall. The plateau itself is cut off from the influence of the sea. The weather in general consists of hot days and cold nights. The annual range is very great. The rainfall on the slopes and the plateau is due to monsoonal effect. Plateau gets heated in summer and attracts winds from the sea. Lower California is a desert being situated in the rain shadow area.	The influence of the Tropic of Cancer will be educed by means of the following questions : 1. Locate the Tropic of Cancer on the map of Mexico. 2. What is the climate of a place having Tropic of Cancer passing through it ? The rainy nature of coastal plains and slopes will be educed from the pupils by making recourse to their previous knowledge. 1. What winds blow in the tropical areas ? (trade winds). 2. What is the direction of these winds in the northern hemisphere ? (N. E.) 3. Will these winds bring rain ? (they are generally

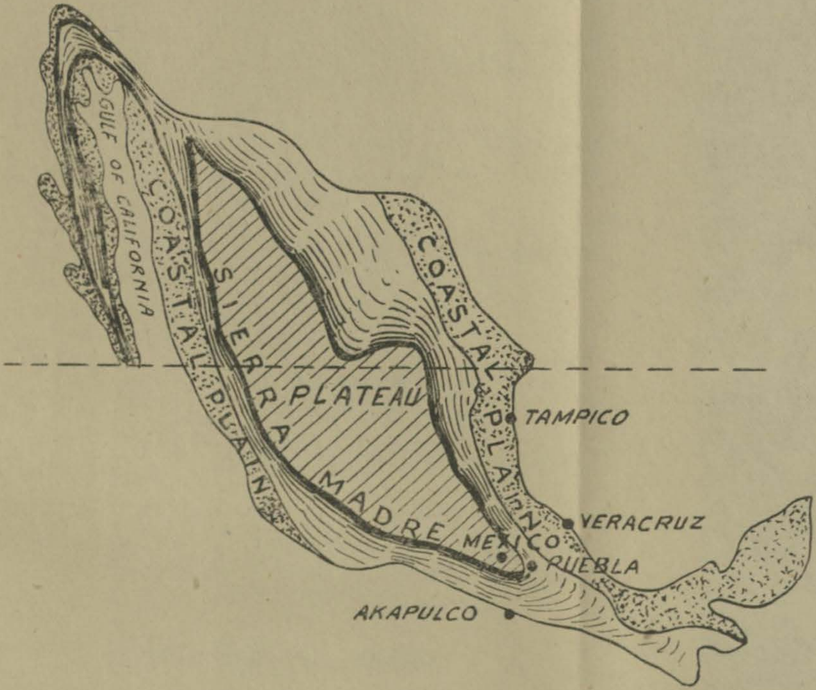


Fig. 30

Physical divisions of Mexico

Matter.	Method.
	dry, but pick up moisture from their passage over the sea). 4. What are monsoons and how are they caused ? 5. How does the plateau get rainfall due to monsoons ? The dryness of lower California will also be educed. 1. What ia a rain shadow area ? 2. How do you account for the dryness of lower California.—

(*b*) **Man and his activities**

The density of population in Mexico is very low. Coastal plains are thinly populated due to unhealthy conditions of climate while the plateau has comparatively thick population.	This low density of population will be explained as well as educed by putting the following questions. 1. Why are the equatorial lands thinly popu-

Matter.	Method.
	lated ? (because of hot and moist climate).
	2. Why are the coastal plains sparsely populated ?
Man cultivates such tropical crops as sugarcane, tobacco and rubber on the coasts. Coffee and maize are grown on cooler and lesser rainy slopes of the plateau. But wheat, cotton and maize are cultivated under irrigation.	The cultivation of tropical crops and the necessity of the irrigation will again be educed by the following developing questions : 1. What is the summer agricultural produce of India ? (Cotton, Rice, Tobacco, Tea, etc.) 2. Describe the climate required for their growth ? (Hot and moist). 3. What can be the agriculture of Mexico then ?
	The control of the physical factors of the country on the activities of man will, particularly, be emphasized.

Matter.	Method.
	A sketch map will be prepared and the distribution of crops will be shown. Before proceeding to the next step the teacher will put the following questions to make the lesson effective :— 1. Why does the plateau receive lesser rainfall than the coastal plains of Mexico ? 2. Name some of the agricultural crops of Mexico and locate their causes of growth.

Step III. MINERAL WEALTH OF MEXICO, ITS INDUSTRIES, TOWNS AND PORTS

Silver, copper and oil are found in great abundance. To make up the deficiency of coal and iron, which are also found in small quantities hydro electric power is generated on the plateau. These minerals are found because of the rocky nature of the plateau.	The richness of the mineral wealth will be told and their causes be traced out and then distribution will be located on the map. 1. Where are minerals found generally ? 2. What minerals are found in Mexico ?

Matter.	Method.
Following are some of the important towns of Mexico. There are mineral towns like, Mexico and Peobla, oil ports of Vera-Cruz, Akapulko and Tampico. Mexico has not developed a large number of industries because of lack of initiative of the inhabitants.	The position of the towns and ports will be shown on the political map of Mexico and the importance of each will be told. Then sketch map of Mexico will be prepared and the distribution of minerals and towns will be inserted. (Fig. 31). After this sectional recapitulation for this step will follow. 1. Locate the importance of the following towns:—Mexico, Veracruz, Peobla and Akapulko and Tampdico, 2. Fill in these towns in the sketch map of Mexico. 3. How do you account for the deficiency of industries in Mexico ?

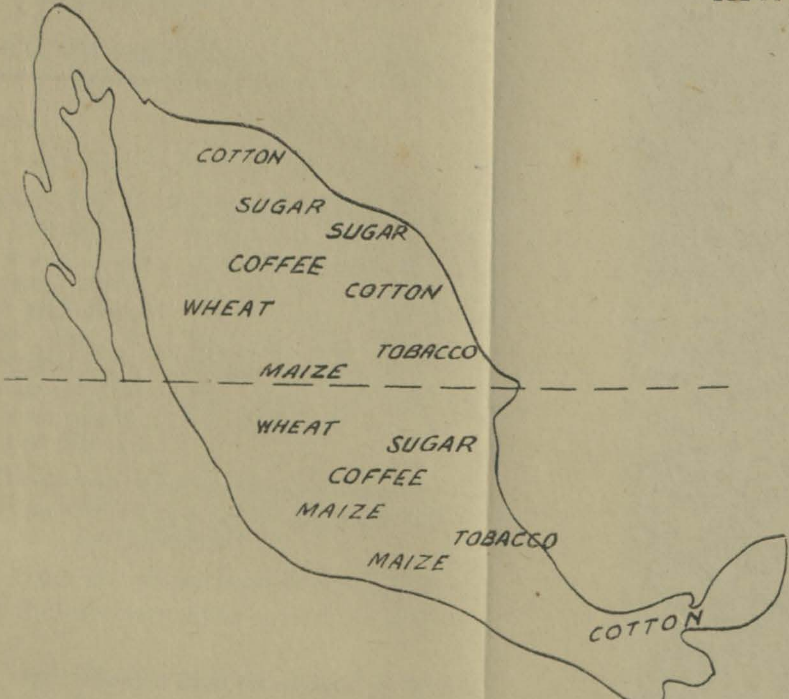


Fig 31

Economic map of Mexico

Step IV. BACKWARDNESS OF COUNTRY

Matter.	Method.
As compared with U. S. A. and Canada, this country is very backward. This is due to physical conditions of relief and climate and also due to unsettled political conditions. Mexico has undergone many revolutions within the last one hundred years.	Pupils will be led to know how the political disturbances and the environmental conditions of climate and relief have all left Mexico a lesser progressive country than Canada and U. S. A.

RECAPITULATION OR COMPARISON AND CONTRAST

In order to put the whole matter in a nut shell, the following thought-provoking questions will be asked :—

1. Divide Mexico into its natural divisions.
2. What do you know about the mineral wealth of mexico ?
3. Where are the following and why are they famous ? Mexico, Peobla, Veracruz and Tampico.
4. Mexico is a backward country. Why ?

Application.—The following questions will be set for hometask :—

Write a geographical account of Mexico. Illustrate your answer with maps.

Black Board Summary.—The blackboard summary will be developed with the progress of the

lesson. It will be mostly in the language of pupils :—

(*i*) **Physical divisions of Mexico :—**

(*a*) Coastal plains (*b*) Hill slopes. (*c*) Plateau.

(*ii*) **Climate.**—Coasts are hot and moist, slopes are cool and rainy and plateau cool and dry.

(*iii*) **Agriculture.**—Sugar, tobacco and rubber; maize and coffee are cultivated on slopes and wheat and maize on tops of mountains.

(*iv*) **Mineral wealth.**—Silver, copper, gold, coal, and iron are found in Mexico, oil in Tampico and cotton goods are manufactured in Veracruz.

(*v*) Backwardness of the country is due to :—

(*a*) Unsettled political conditions.

(*b*) Tropical climate.

(*c*) Relief features.

APPENDIX B

NOTES OF LESSON ON GEOGRAPHY

Class	...	IX.
Subject	...	Geography.
Topic	...	Rainfall of India.
Time	...	40 minutes.
Date	...	29-5-45.

Apparatus.—Usual classroom apparatus, a climatic or rainfall map of India, an outline sketch map of India on the blackboard, two sketch maps of India showing summer and winter rainfall conditions respectively. A relief map of India showing the direction of winds and distribution of pressure, a pointer and some coloured chalks.

Aim.—(*i*) To acquaint pupils with the distribution and extent of summer and winter Monsoons of India. (2) To broaden their vision and outlook by giving them new information.

Previous Knowledge.—Pupils have read the surface features and they know what are periodical winds, *i.e.*, Monsoons.

Introduction.—The teacher will put the following questions to test the previous knowledge of pupils and also to link the new lesson with the old one :—

(1) Show the chief mountains of India on the map.

(2) What are Monsoons ?

Announcement of the Aim.—The teacher will announce to the class, "To-day we shall find out the causes and distribution of rainfall in India in summer as well as in winter."

Presentation.—The whole topic will be divided into the following two parts :—

(A) Summer Monsoons.

(B) Winter Monsoons.

(A) Summer Monsoons.

Step 1. **Monsoons of the Bay of Bengal.**—The teacher will start to-day's lesson by referring to the tropical situation of the country. She will show on the map the presence of the tropic of cancer through the heart of the country. She will try to educe from pupils the south-west direction of the summer monsoons. After this the teacher will tackle the following branches of Summer Monsoons of the Bay of Bengal.

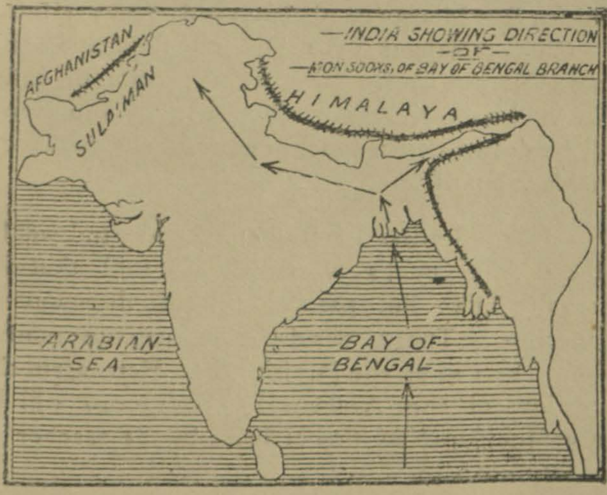
(*a*) The comparative distribution of high and low pressure on the Ganges delta and Bay of Bengal will be referred to explain the blow of winds arising from Bay of Bengal which rise up Khasi, Garo and Jantia hills. (The position of these hills will be located by the pupils on the map). It will be emphasized that Cherapunji situated in this area gets the heaviest rainfall in the world.

(*b*) Another branch of the Bay of Bengal Monsoons that rise up the Himalayas will be

located and explained and the effect of relief on the control of the direction of these Monsoons which blow westward up the Ganges valley will be educed from pupils by locating the presence of Himalayas on the north and smaller hills on the east.

Pupils will be led to conclude that these monsoons get drier and cause lesser rainfall as they go towards the west. This point will be emphasized by examples that Calcutta receives 50″ rainfall, Benares 30″, Delhi 20″, Lahore 15″ and Peshawar 5″.

The direction and movement of these winds as determined by the relief features of India will be explained by the relief and rainfall maps as is shown in Fig. 32.



(Fig. 32).

Sectional Recapitulation.—Why does Lahore receive lesser rainfall than Benares ?

Step II. **Arabian Sea Monsoons.**—In this step the three branches of the Arabian Sea Monsoons will be taught.

(*a*) *Western Ghatd Branc*·—To emphasize the effect of relief on the rainfall of India, the part played by the western ghats will be educed. After crossing the ghats winds become dry and give about 20″ of rainfall to the table-land of Deccan. In Madras there occurs only 15″ of rainfall.

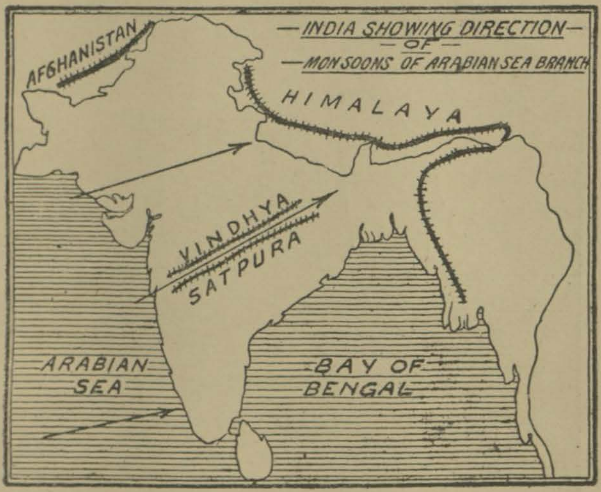
(*b*) *Narbada valley branch.*—The Satpura and Vindhya mountains afford a free passage to the Arabian Sea Monsoons which shed heavy rainfall in Chota Nagpur by rising up Rajmahal and Chotta Nagpur hills. The parallel position of these hills will be shown on the relief map of India and will be drawn by the teacher as well as by pupils on the black-board.

(c) The dryness of Rajputana and Sind will be educed from pupils who will be told that the Aravali hills lie parallel to the direction of monsoons. These winds give copious rainfall when they rise up the Punjab hills. Here again the direction of the Arabian Sea monsoons will be shown on the relief map of India by the teacher as shown in Fig. 33.

Sectional Recapitulation.—In order to test what they have studied the following recapitulatory

question will be asked :—

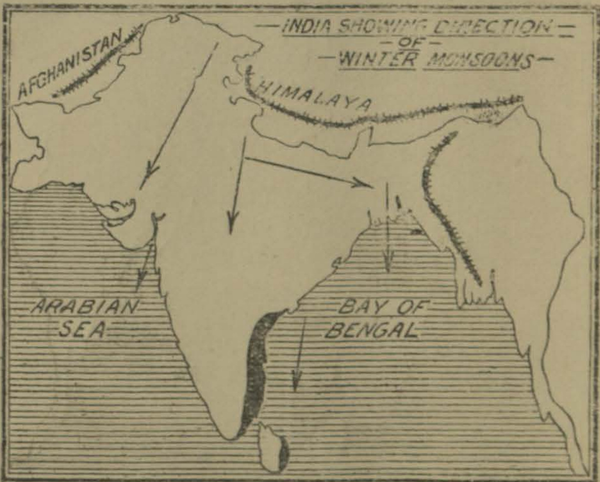
Why is Madras practically dry when Malabar coast is receiving heavy rains ?



(Fig. 33 .

B. *Step.* **Winter Monsoons**—The north-east direction of the winter monsoons will be educed by drawing their attention to the position of the sun during the months of November, December and January. The dry nature of these winter monsoons will be explained by telling them that they blow from land to sea and they pick up moisture during their passage over bodies of water. The heavy rainfall in Madras and on the mountains of Ceylon in winter season will be educed from pupils. The teacher will point them out the exis-

tence of Eastern Ghats. A map giving the direction of winter monsoons and areas having winter rainfall will be prepared on the black-board in the presence of the pupils as shown in Fig. 34.

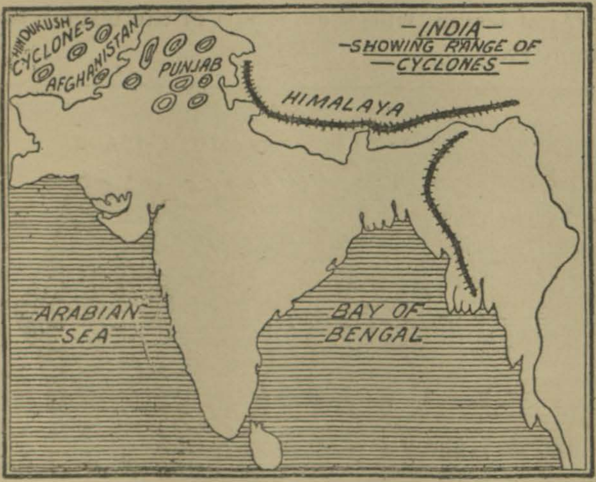


(Fig. 34).

Step IV. **Winter rainfall in Punjab due to cyclones.**—The attack of cyclones on the Hindukush, the Sulaiman mountains and the Punjab hills will be explained in outlines with the help of a diagram as shown in Fig. 35.

Final recapitulation.—In order to summarise the whole thing the following questions will be asked :—

1. Why does rainfall decrease as we go up the Ganges valley and increase as we go up the Indus Valley ?



(Fig. 35).

2. Name the parts of India which receive rain in winter due to winter monsoons.

3. Account for the winter rainfall in the Punjab.

4. Why does Madras get rainfall from both the monsoons ?

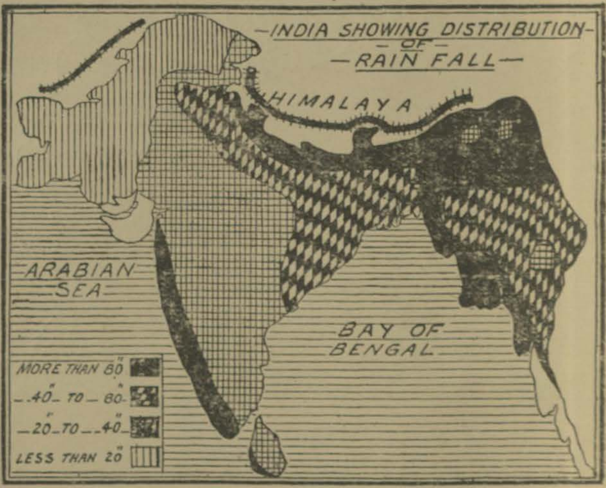
Application.—The following questions will be set for home task.

1. Draw two maps of India showing summer and winter rainfall.

2. Draw a map of India showing dry and wet areas.

Black-board summary.—The black-board summary will be developed with the progress of the lesson. Mostly, it will consist of answers to the recapitulatory questions. The diagrams shown in the

notes of lesson will form a part of the black-board summary.



(Fig. 36).

1. **Kinds of Mansoons :**—(*a*) Summer Monsoons (*b*) Winter Monsoons.

(A) **Summer Monsoons** are also called south-west monsoons because they come from S.W. derection and they are formed of the following branches :

(*a*) Bay of Bengal monsoons.
(*b*) Arabian Sea monsoons :—
 (*i*) Western Ghat branch.
 (*ii*) Narbada Valley branch.
 (*iii*) Rajputana and Sind branch.

(B) **Winter Monsoons** are also called North-East monsoons because they come from N.-E. direction. Regions of winter rainfall are the Punjab, the Madras and the east coast of Ceylon.

APPENDIX C

NOTES OF LESSON ON GEOGRAPHY

Class	...	IX.
Average age	...	14 years
Subject	...	Geography.
Topic	...	Causes of the currents.
Time	...	45 minutes.
Date	...	28-5-45.

Apparatus.—Usual class room apparatus and a wall map showing currents. An apparatus and its diagram to show that water keeps its level. Another diagram showing the direction of winds. A chart showing clockwise and anticlockwise movement of currents in the ocean. A chart showing currents of the Atlantic ocean.

(1) **Aim.**—To make pupils understand the causes of the currents, and (2) to broaden their outlook by providing new information.

Previous knowledge.—Pupils are already acquainted with the major and the minor oceanic movements. They have previously studied Ferrel's law in the study of atmosphere.

Introduction.—The teacher will ask the following questions to test their previous knowledge.

1. What different types of movements are found in an ocean ?

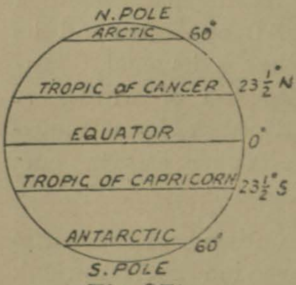
2. What is the difference between a wave and a current ?

Announcement of the aim.—The teacher will announce, "Let us to-day study the causes of the currents".

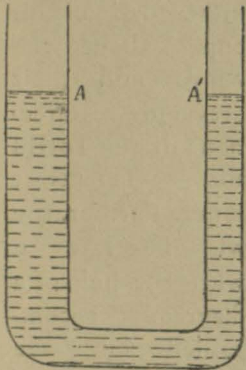
Presentation :—

Step 1. CAUSES OF THE CURRENTS

(*a*) **Difference in Temperature.**—The teacher will educe from pupils the distribution of insolation with the help of a sketch map drawn on the black-board Fig. 37 and will tell them that the hot water of equator expands after it gets heated and moves along the surface of the ocean towards the poles. While the cold denser water of higher latitudes creeps down and is warmed on reaching warm latitudes. There it rises and flows towards the poles. A diagram to illustrate this will be drawn on the black-board. In order to make it clear examples of Gulf Stream Drift which expands and moves towards cold latitudes and the cold Labrador current of the Atlantic ocean which moves down to the equatorial lands will be quoted.



(Fig. 37).
Heat Zones.



(Fig. 38).
Apparatus to show that water keeps its level.

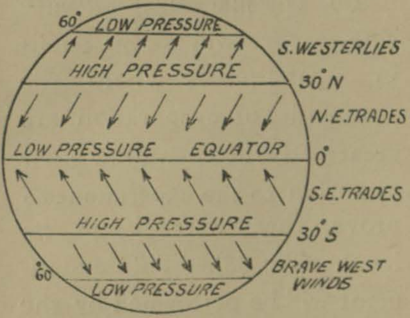
(*b*) *Unequal Evaporation*:—The teacher will ask his pupils to name places where the possibilities of evaporation are great and will then draw their attention to the experiment to prove that water keeps its level. (Fig. 38). This experiment will be performed by the teacher in the class.

Experiment.—The teacher will pour water in tubes of different dimensions. It will stand at the same height in both the tubes as shown in Fig. 38. Students will apply this conclusion in explaining the flow of currents from the Baltic to the Atlantic and from the Atlantic to the Mediterranean Sea. It will be pointed out that the Mediterranean sea is surrounded by deserts and therefore gets its water evaporated. On the other hand the Baltic sea receives large supplies of fresh water from European rivers.

Sectional Recapitulation.—(1) Why does the Equatorial water flow towards the poles ?

(2) How does the unequal evaporation of the sea water affect the movement of oceans ?

(c) *Winds.*—The teacher will revise the previous knowledge of his pupils about the winds and their prevailing directions in the Torrid and Temperate zones. Further, she will illustrate it with the help of a diagram accompanied by the following questions: —



(**Fig 39**).
Permanent winds and their Direction.

What is the direction of the Westerlies ?
What is the direction of Trade winds ?

After this she will differentiate between a current and a drift, that a current flowing under the influence of winds is called a drift. She will present examples of the currents which have been influenced by Trades and Westerlies like the Gulf Stream Drift and the Kuro Siwo drift. Their directions will be pointed out on the map.

(d) *Relief.*—The teacher will tell them that at many places the original course of a current is obstructed by land. She will illustrate it from the wall map how the land at the Equator prevents complete circulation of water round the earth from east to west and deflects currents northwards and southwards. Further, she will show how in South Atlantic water is deflected north by the land mass

of Africa and is named Benguea current. Another example of this is the South Equatorial current which becomes Brazil current due to the existence of Cape St. Roque on the east coast of South America. The teacher will give sufficient mass and individual drill in the pronunciation of the names of the currents.

(*e*) *Rotatian of the earth.*—The application of Ferrel's law will be introduced to explain the effect of the rotation of the earth. The teacher will tell them that all moving bodies on the surface of the earth are deflected to the right of their course in the Northern Hemisphere and towards the left in the Southern Hemisphere. She will illustrate it from the map how currents instead of flowing towards north or south as the case may be turn either left or right of their true courses. This will be proved by performing the following experiment in the class :—

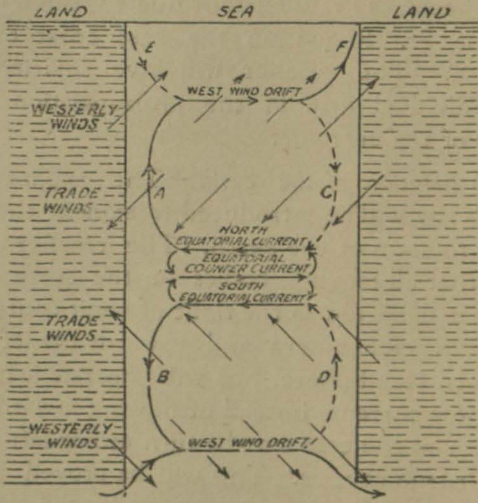
Experiment.—The globe will be rotated and a line will be drawn from the above. Students will observe that the line has been turned away from its true course due to rotation of the globe.

Sectional Recapitulation.—1. How do winds cause a current ?

2. What part does the relief of land play in the movement of water ?

II Step. **The clockwise and anti-clockwise circulation of ocean currents.**—It will be explained by a diagram that the movements are clockwise in the Northern Hemisphere but anti-clockwise in the

Southern Hemisphere, due to the combined influence of all factors stated above. (Fig. 40)



(Fig. 40) (After Preece & Wood)
The clockwise and anticlock wise circulation of ocean currents.

The teacher will link this knowledge with the previous knowledge of his pupils telling them that this law governing currents conforms to the general direction of winds. After this the meaning of the warm and the cold currents will be explained and concrete examples will be put forward by the teacher. It will be stressed on their minds that unlike winds currents are named according to the direction towards which they flow.

Recapitulation.—The teacher will put the following questions to revise the whole lesson :

1. Name the different causes of currents.

2. What is an easterly current ?

3. Where do you find the clockwise movement ?

Application.—A brief outline study of the currents of the Atlantic Ocean will be made from the map to apply the knowledge gained by them in to-day's lesson.

Black-board summary.—The teacher will write the following summary on the black-board during the course of the lesson :—

(1) *Causes of the currents t*—

(*a*) **Difference in Temperature.** Warm water expands and moves as a surface current towards the cold regions. It sinks there and returns as an under current towards warmer latitudes.

(*d*) **Unequal evaporation.**—Water keeps its level. So water flows from the Atlantic to the Mediterranean sea.

(*c*) **Winds.**—Westerlies and Trade winds push the water ahead of them.

(*d*) **Rotation of the earth.**—Water swirls round towards the left in the south and towards the right in the north.

(2) **Clockwise and anti-clockwise movement of the water.**—There is a clockwise movement of water in the Northern Hemisphere and anti-clockwise in the Southern Hemisphere.

(3) **Naming of a current.**—An east current is one which goes to the east and a west current is one which goes to the west.

APPENDICES D & E

ON

THE NEXT PAGE

APPENDIX F

PUNJAB REVISED SYLLABUS

CLASS I

Life at Home

Home life in other parts of India.—taught through pictures of children and houses, both rural and urban, in Bengal, Madras, Kashmir, North-West Frontier, Peshawar, Lahore, Amritsar, Bombay, Delhi, Calcutta and Punjab Villages, etc.

The world around us.—Watching the sunrise and sunset and enjoying their beauty, learning the directions east and west, learning right and left, simple concepts of the earth, the sun, moon and stars.

Water.—common sources ; use for drinking, bathing, washing clothes and for irrigation of plants ; clean and dirty water.

Activities.—Making east and west on the play-ground or school-room floor ; playing direction games. Keeping school supply of drinking water clean. Using waste water to water plants and trees.

CLASS II

Life at Home and School

Shelter.—What materials are used in house construction in the locality ; distinction between non-

living things like clay, sand, wood, metal, and living things (plants and animals); homes of primitive men (caves and trees, etc.), houses and home life in other parts of the world, among the Eskimos, the Red Indians, the Japanese, the English and the Zulus.

Observation of the direction in which houses face (north, south, east and west only)—the school, the house, and the post office.

Clothing.—Why it is needed; changes of the season and need of changing clothes; observation of the weather, wind, rain, hail, clouds, dew, rainbow (on actual occurrence); keeping the clothing clean; care in the use of ink.

The world around us—The sun and the earth; the sun as source of light and heat; observation of shadows; the moon and stars; simple observation and stories about them;

Air.—How fire burns; what to do if clothing catches fire;

Water.—Source of supply, rain, well, water-pump, spring, river, pond, canal; excursion to the nearest nullah, river or canal for observation of water and its qualities and uses.

CLASS III

Community life.—The Village or the City.

A.—*Observation.*—The family and its helpers—how the community (village or city) helps to supply the families with food, clothing and shelter. How the community meets other needs of its members.

Visits to railway station, bus station, post office (if these are not in the village, pictures should be shown); observation of places of worship such as mosque, gurdwara, temple, and church.

How families live together in Distant lands.

(*a*) Life in a Swiss village—pasturing, dairying.
(*b*) Life in an Irani village—carpet-weaving,
(*c*) Life in a fishing village in Newfoundland.
(*d*) Life in a coal-mining area in England.
(*e*) Life in Pagoda-land-forest and river life.
(*f*) Life in a Chinese village—silk.
(*g*) Life in an industrial town in England and India.

The location of our village (or city)—Observation of the environment extended to the tehsil and district, explaining general features of the relief, climate, crops, industries, local historical monuments, places of worship, etc.

The world around us.

The globe.—Where people of distant lands live ; rough location on a home-made globe of the countries, studied under No. 1.

The Sun.—As source of light ; what causes day and night (simple demonstration with home-made globe and lantern or electric torch) ; the sun as source of heat ; further observation of the weather ; the need of the sun for plants, animals and people.

The surface of the earth.—How rivers are made, right and left bank and slope ; how water makes soil.

(*b*) *Activities.*—(Some of the following) :

Helping the teacher to make a globe from a round water-jar (children can sandpaper and white-wash the jar, the teacher should outline the continents and oceans, painting in colours) : helping the teacher to make a globe of paper mache ; keeping a weather record ; singing and rhythmic games ; painting, paper-cutting and tearing, modelling in clay.

CLASS IV

(*a*) *First contact with the geography of the province* with reference to its natural divisions and occupations of the people (climate, agriculture, industries and communications). Subject-matter to be presented in a simple non-technical form within a compass of 50 pages only.

(*b*) *Globe.*—The stories of the exploration of the World—Marco Polo, Vasco-da-Gama, Columbus.

Practical.—The action of running water, comparison of running and stagnant water ; well and river water ; to illustrate that (*i*) water flows from high to low level and carries mud, (*ii*) two or three channels make a nullah.

(Explain after a shower of rain in the school compound). Reading a map of the Punjab.

CLASS V

(*a*) *First contact with the geography of India.*—With reference to its natural and political divisions and life and occupation of the people (climate, agriculture, industries and occupations).

(*b*) *Stories of exploration.*—Magellan and Everest.

(*c*) *The globe.*—Principal land, sea and air routes in the form of stories, explaining life of man in the places on the way, India to Europe, to Arabia, to the Far East, and to Australia.

(*d*) *The Punjab.*—Revision of what has already been done in class IV.

CLASS VI

(*i*) A *regional study of the Punjab* with reference to natural regions, position, size, relief, climate, winds, and rainfall, human life, political divisions, a few important towns, means of communication, irrigation, distribution of crops, sheep and cattle, population and trade.

(*ii*) *Stories of the exploration* of the north and the south poles.

(*iii*) *Physical Geography.*—Soils and their characteristics; wearing out of rocks because of the action of frost, rain, wind and rivers on land and sea along the coast; temperature zones of the globe; variations of the temperature in similar latitudes and influence of altitude on temperature.

(*iv*) *Practical.*—Use of wind vane, raingauge, barometer, recording of rainfall, and air pressure by observation.

(*v*) *Excursions to observe* local means of irrigation, crops and methods of cultivation. Visits to a factory, railway goods office and octroi post, where possible.

(*vi*) *Filling in outline maps of the Punjab*, showing different simple features.

CLASS VII

(*i*) *A Regional Study of India.*—As for the Punjab in class VI. Emphasis to be laid only on details bearing on the economic resources of the various regions.

(*li*) *Physical Geography.*—The shape and size of the earth ; lines of latitude and longitude ; causes of variation in the length of the day in different seasons.

(*iii*) *Practical Work.*—Practical use of maximum and minimum thermometer ; recording of temperature and humidity, formation of dew, fog, mist, clouds, rain, by actual experiments ; latitude and longitude with reference to the locality ; altitude of the mid-day sun.

CLASS VIII

(*i*) *An outline Geography of the World.*—Continents, oceans and important countries with special emphasis on those having relationship with India.

(*ii*) *Stories of journeys* by air, sea and land, with India as centre.

(*iii*) *Revision of ground covered in classes VI and VIII.*

(*iv*) *Physical Geography.*—Rotation and revolution of the earth, change of seasons, prassure of air, pressure varies with altitude and pressure in various parts of the country.

(*v*) *Filling in outline maps of the world* showing different simple features ; contours with the help of simple exercises ; reading maps of the globe.

For class IX and X
See University Matriculation course.

APPENDIX G

SYLLABUS RECOMMENDED BY TEACHERS OF THE BOMBAY PRESIDENCY.

CLASS I

Home Geography.—Topics of local interest, e.g., the bazar, the temple, the railway station, roads, fields, seasonal fairs, festivals, etc. Discussions on these topics should invariably be in relation to excursions actually undertaken. The number of excursions not to be less than four during a year.

World in Outline.—Talks with the help of pictures about things of every day use ; how they come to the country, and whence, *e.g.*, tea, coffee, sugar, matches.

Stories of children from other provinces and other lands. *e.g.*, the Konkani or the Koli boy, the Madrasee school boy, the Kathiawari peasant boy, the Japanese, the Kafir, the English and Dutch boys.

Handwork and Practical Work.—1. Collection of labels, pictures, etc., and pasting them in the pupil's exercise books.

2. Finding simply the bearings of various things in the room or play-ground by sun direction —East, West, North and South.

3. Observation of rain water flowing by the side of roads or in a small brook; of the carrying work of running water; of tributaries and the main currents.

4. Simple sketches of the things observed.

CLASS II

Home Geography.—Recognition of the plan of the school building, and of the neighbourhood where excursions have been actually taken by the teacher.

Study of Taluka.—Topics regarding the crops, bazars, important places, fairs, in so far as they refer to the economic activities of the people of the Taluka. There should be no hesitation in referring to places which lie outside the Taluka, but which have intimate relation with the topic in hand. Lessons to be illustrated by means of pictures.

World in Outline.—Stories of children from about four different natural regions, *e.g.*, the Eskimos, Red Indians, Laplanders, Arabs, Pygmies, Russians, Kirghis, Tibetans, Chinese. Malays, people in the South Sea Islands, etc., and four from the following: The Nepali boy, the Moplah boy, the Gond boy, the Jat boy, the Punjabi boy, the Bengali boy, the Maratha boy, and children from other Provinces of India.

Lessons to be illustrated with the aid of good pictures and with reference to a black board globe with outlines of countries drawn on it

Handwork and Practical Work.—1. Handwork connected with the stories taken; making a

toy net of a fisherman, a boat, oars, arrows, sword, shield, etc.

2. Ability to read the map of the taluka with reference to problems connected with the topics dealt with in the class, *e.g.*, planning of imaginary tours to places of interest in the taluka. Keeping a record of excursions in the form of a child's pictorial diary.

3. Observation of the noon-day shadow cast by a rod once every month (weather permitting).

4. Finding the direction with the help of a compass. Preparing a compass card.

5. To make a simple windvane. Observation of wind direction for a week, and every third month, and record as under :—

Week.		*Where the wind comes from.*
1st. Week, July.	...	Mostly from S.-W.
1st. Week, December.	...	Mostly from N.-E.

6. Record of rainfall, week by week, from June to October, and afterwards whenever there is rain. Observation of rain clouds.

7. Collection of seasonal vegetation. Drawing pencil or crayon pictures of the same.

CLASS III

Home Geography—Study of the district in particular : local physiography, local commerce and topics with reference to the economic activities of the people of the district. Study of the Presidency in general—only important topics to be dealt with, e.g., the cotton, the glassware, the brassware, the

sugar, and the paper industries in the Bombay Presidency. Some important crops like wheat, jwar, rice. Places of interest and how to reach them. Factors of climate and relief to be dealt with in connection with the problems arising during the lesson.

World in Outline.—Any four stories about the people of the world to be continued with special reference to the industries of the people, *e.g.*, Fishing in Norway, the Danish Farm and Butter Factory, Lumbering in Canada, Rubber in S. America, Diamond mining in S. Africa, Gold mining in S. Africa, Australia and Alaska. Meat industry in Chicago.

A globe with mere outlines of countries to be made use of.

Practical Land Observational Work.—1. Collection of advertisements connected with the industrial product dealt with in the class.

2. Making any one typical scene depicting the industrial life dealt with in the class. Filling in an outline map (with crayons if possible) connected with the lessons in the class.

3. Observation of the noonday shadow to be continued.

4. Observation of the change in the shape of the noon for about a month continuously (how the moon appears to move from west to east day by day.) Observation of the Great Bear (from February to June).

5. Observation of the neighbouring streams, and of the work of running water. Simple sketches to illustrate the observation.

6. Plan of school room showing the relative position of the various objects in the room. Plan of school building on paper of the same size as before. Map of the route leading from home to school.

CLASS IV

Home Geography.—Study of the Bombay Presidency in particular, and of India in general, regard being paid to the economic activities of the people, *e.g.*, the cotton industry, the tea industry, the coffee industry, the wheat growing industry, the forest industry, the fishing and pearl industry, the jute industry, the mining industry, the steel industry.

Places of interest and how to reach them. Factors of climate and relief to be dealt with in connection with the problems arising during the lesson.

World in Outline.—Stories of any six peoples of the world—with special reference to stories of adventure and exploration, and to the special national characteristics of the peoples of the World—Germans, French, Czechoslovaks : Japanese, Turks, Indians, New Zealanders, Norwegians. Swiss, Americans, etc.

A globe to be made use of with mere outlines of countries.

Practical and Observational Work.—Encouraging pupils to collect pictures, advertisements, postal stamps connected with the lessons.

Drawings of a few flags of the nations of the world. Filling in outline maps with details pertaining to the lesson. Drawing an outline map of India. Observations of noon temperature, rainfall and wind directions. Observations of the length of the period of sunshine on a day in winter, in spring, in summer and in autumn. The longest day, the longest night, change in seasonal temperature. Learning to recognise constellations which give rise to the names of the Hindu months. Finding out and preparing tables about the monthly rainfall for a year about places chosen by the teacher. Drawing sketches of river basins, and of distinctive regions Sketches to illustrate the importance of towns and ports.

CLASS V

Portions of the World.

Asia.—The life of the people in

(1) The Monsoon Lands of Asia.
(2) The Desert Lands of Asia.
(3) The High Lands of Asia.
(4) The Coast strips of Asia.
(5) The Plains watered by the great rivers.

The distinctive characteristics of the Arabs, Chinese, Japanese, Russians, Persians, Turks, etc.

Australia.—Discovery, animals, seasons, sheep-rearing, cattle-rearing, fruit-growing, forestry, scrub lands, wheat lands, minerals, sea routes, ports.

New-Zealand.—Volcanoes, geysers, earthquakes, wheat, meat, minerals, factors of climate and relief to be dealt with in connection with the problems arising during the lessons.

India.—India's economic relations with the continents to be studied during the year.

Practical Work.—1. Use of the rain-guage and the thermometer. Keeping of records of rainfall and temperature for the year. Graphs of rainfall and temperature.

2. Collection of different kinds of rocks and minerals found in the locality.

3. Observation and record of the seasonal vegetation and the agricultural crops. (Kharif and Rabi crops.)

4. Drawing sketch-maps of important river basins and distinctive regions and the chief towns and ports in the continents to be studied.

CLASS VI

Portions of the World

America.—Agricultural, Forest and Mineral wealth.

Cotton, Fur, Pigs, Tobacco; Fishing, Californian Fruit; Towns, Communications; The Red Indians, Prairies; The Panama Canal; The Amazon Valley; Rubber, Coffee; The Andes; Meat in Argentine, Wheat, Cattle ranching, Sugar and Cocoa.

Africa.—Railways in Africa; Rubber in the Congo forests; Life of the people in the Nile Valley; The Suez Canal; Rhodesia; Dutch treaking; Explorer's life in the wilds of Africa.

India.—India's Economic relations with the continents to be studied during the year.

Practical.—Drawing sketch maps of important river basins distinctive regions, chief towns and ports in the continents to be studied.

Drawing a diagram to illustrate the ocean currents of the world.

CLASS VII

Portions of the World

The British Isles.—Industries, the Gulf Stream, Fishing, Coal and Iron, Shipbuilding, Railways, growth of cities and ports

Europe.—Climatic regions, The Alps, Coniferous forests, Fruit lands, Agricultural lands, Industrial lands.

British Empire.—How the daily needs of a Britisher are satisfied by the products of the Empire :—

(1) Food, (2) clothing, (3) raw materials for manufacturing.

India.—India's place in the economic world.

Practical.—Drawing sketch maps of important river basins, distinctive regions, chief towns and ports, means of communication exports and imports in the continents to be studied.

Drawing a diagram to illustrate the revolution of the earth and showing its effect on the length of days and nights.

CLASS VIII

(*i*) *Regional Geography of the World.*—1. General principles of climatology. Latitude, Altitude, Prevailing wind direction and ocean currents, distance from the sea, physical features, water, mountain

and hill ranges, forests, deserts, towns, etc., soil formation and structure.

2. *The earth.*—Shape and size, Rotation and Revolution, Longitude, Local time and Indian standard time, Seasons, Volcanoes, Geysers.

3. *Temperature* and latitude
   „ „ altitude
   „ „ sea

4. *Rainfall*-causes and distribution of :—

(*ii*) *The World's great regions* :—

(1) Forests (Equatorial and Temperate).
(2) Deserts (Hot and cold.)
(3) Grass lands (Savanas and Temperate.)
(4) Agriculture (In hot lands, temperate lands and mediterranean regions).

(*iii*) *Primitive life* in the above mentioned regions : food, occupation.

(*iv*) *Animals* : characteristics of several regions and their uses.

How men are affected by natural conditions. How far man has got himself adjusted to surroundings.

India —Revision of India's natural regions.

CLASS IX

Industrial and commercial world.—Man's conquest of Nature.

(*i*) Agricultural products :—

(*i*) Wheat, foods : The conditions of their growth.
(*ii*) Rice.
(*iii*) Cotton.

(*iv*) Silk, flax, etc.

(*v*) Tea, coffee, cocoa. drinks.

(*ii*) Mining (1) Coal and Iron : (2) Gold, Copper and Manganese, etc.

Factors governing-Labour-Capital-Facility-Power.

(*iii*) The World trade : (1) Routes, (2) Conveyances, (3) Man and his markets.

(*iv*) The manufacturing nations.

(*v*) The Sun's altitude. Pressure and Winds, Cyclones, Ocean currents.

(*vi*) The occupations of mankind.

India's place in the industrial and commercial world.

(*vii*) The Geographical museum.

CLASS X

The Progress of mankind and review.

1. The ancient civilisations : Greece, Egypt, India and China.
2. The Modern civilisations : England, Germany, U. S. A. and Japan.
3. The people of the plains, the sea and the mountains.
4. The material advancement made by man, by modifying or utilising natural conditions.
5. Industrial revolution.
6. Man, Raccs of, Religions of, Ideals.
7. The Geographical unity of mankind.

India.—India's contribution to the progress of mankind.

APPENDIX H

PUNJAB UNIVERSITY QUESTION PAPERS

1941

1. What educational objects does the modern teacher try to achieve through the teaching of geography? In what important respects does the presentation of his material differ from that adopted by the geography teacher of yesterday?

2. What do you consider to be the place of the following in the teaching of geography in the high school?

(*a*) Outdoor work, (*b*) Excursions, (*c*) Text book, (*d*) Maps.

3. Suggest methods of correlating geography work with nature study or history. Give examples.

4. Write notes of lesson on one of the following topics :—

(*a*) Indian Air Routes.
(*b*) Development of Indian industries.
(*c*) The monsoons.

1942

1. Discuss the importance of (*a*) Regional geography and (*b*) Home geography, as a part of the curriculum of secondary schools.

2. In the teaching of geography in schools discuss the value of any four of the following :—

(*a*) Globe (*b*) Motion pictures (*c*) Museums. (*d*) Drawing (*e*) Charts and graphs (*f*) Outline maps.

3. What scientific experiments would you use in introducing any three of the following :—

(*a*) Formation of clouds.

(*b*) Day and night.

(*c*) Seasons.

(*d*) Causes of wind and air current.

4 Discuss the use of (*a*) Dalton method (*b*) Project method in the teaching of geography, which do you prefer and why ?

1942 September.

1. Show how you would introduce :

(*a*) Convectional and relief rainfall to class VIII.

(*b*) Land and sea breezes to class VI.

2 Write short notes of a lesson for the introduction of the Monsoons to class VI.

3. Write an essay on any one of the following:—

(*a*) Equatorial region,

(*b*) Mediterranean region,

(*c*) The hot deserts.

4. Discuss the importance of (*a*) Economic geography, (*b*) Historical geography, as a part of the geography curriculum.

1943

1. Discuss the place of oral tests in the teaching of geography.

2. How far do you consider map work as a usual exercise for students in learning geography ?

3. What geographical factors have favoured the development of the following :—

(*a*) Delhi. (*b*) Bombay, (*c*) Allahabad, and (*d*) Calcutta.

4. Write a geographical account of Burma and state how far it is important for India to have Burma as a part of one and the same empire.

1943 September

1. Explain, what is meant by the Regional method of teaching geography. Show how would you teach Ceylon by this method.

2. Fully discuss the value of map work in teaching geography.

3. State the geographical factors necessary for the growth of the following,

(*a*) Wheat, (*b*) Rice, (*e*) Jute, (*d*) Cotton and (*e*) Tea.

4. Give an account of the following instruments,

(*a*) The thermometer, (*b*) The barometer, (*c*) The rain-gauge, and (*d*) The compass.

1944

1. Discuss the use of (*a*) Regional method, (*b*) Comparative method in the teaching of geograghy in secondary schools.

2. Why is geography an important part of school curriculum and what is our aim in teaching it ?

3. Draw a diagram to show the belts of prevailing winds on the surface of the earth.

Describe how they are caused and state their climatic value.

4. State and discuss the functions of the external forces affecting the surface of the earth.

1944 September

1. State and discuss what you consider the main geographical factors that favour the development of (*a*) human settlement, (*b*) human occupations.

2. "Geography has a unique place, being both a scientific and a human subject". Discuss the place of geography with reference to the above statement.

3. Describe with the help of a diagram, how the annual migration of the wind belts takes place and state its main consequences.

4. Differentiate between climate and weather and discuss the value of each for human activity.

1945

1. (*a*) What do you understand by Regional Geography? Explain fully.

(*b*) Divide the Punjab into its main natural regions giving your reasons for this division.

2. What apparatus would you require for making weather observations in a high school?

Describe in detail the working of a maximum and minimum thermometer.

3. What are the different methods of graphically representing Geographical satistics? Illustrate your answer with relevant diagrams.

4. (*a*) Draw all the diagrams, that you think should be necessary for giving a lesson on "the causes of changes in seasons," to the IX class of a secondary school.

(*b*) What practical work would you expect of your pupils to have performed before you give this lesson ?

5. (*a*) What is the value of excursions in the teaching of Geography in schools ?

(*b*) Presume that you are going to take out some school children of middle classes on an excursion to a river-side. State the observations you would require them to make so that the excursion becomes interesting and instructive.

6. Into what climatic regions would you divide Australia ? Show these regions on the outline map of Australia provided. Describe the climate and products of any two of them.

7. Suppose that you have been appointed a Geography teacher in the newly started high classes of a school, and a room has also been placed at your disposal. What material would you require for the efficient teaching of your subject ?

8. (*a*) What are the aims and objects of teaching geography in an elementary school ?

(*b*) What steps would you take to develop an understanding of the map in the minds of young pupils ?

9. What principles would you bear in mind in drawing up the Geography syllabus for middle classes ? Suggest an outline syllabus for the V class of a Punjab school.

10. Write notes of lessons on one of the following :—

(*i*) Distribution of rainfall in India.
(*ii*) Iron and steel industry in India.
(*iii*) Canal irrigation jn the Puniab ?

1945 September

Paper IV, V and VI

Methods of Teaching Special Subjects :

Croup B (*iii*) : GEOGRAPHY.

Time allowed : three hours.
Maximum marks : 100.

Note.—Attempt any FIVE questions. All questions carry equal marks. Answers should be concise and to the point. No credit will be given for unnecessary details.

I. What special points would you bear in mind and what special devices would you use in giving a Geography lesson ?

II. What are the different methods of teaching Geography in High Classes ? Which method do you, as a teacher of Geography, prefer ? Give your reasons.

III. Comment upon the following statement :—

"Geography is the description of the earth. Its chief use to the average citizen is that it helps him to read the newspaper intelligently."

IV. What principles would you bear in mind in drawing up the syllabus in Geography for the Middle Schools, of the Punjab ? Suggest a syllabus

which, you think, should be suitable for the V Class.

V. What is meant by 'the scale of a map'? What are the different methods of showing the scale ? Draw a scale line for a map whose R. F. is 1 : 63360 to read in yards.

VI. What is a Major Natural Region ? Describe the climate and vegetation of the Monsoon lands of Asia.

VII. Give the different types of exercises in educational handwork useful for the teaching of Geography in the VIII class of a Punjab School.

VIII. "Geography may be regarded as the stage for the drama of History." Explain this statement bringing out clearly the influence of Geography on History.

IX. Write lesson notes on any one of the following :—

(*a*) Distribution of population in India.

(*b*) Cotton industry of India.

(*c*) Major manufacturing industries of the Punjab.

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THE END